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HARD CURED PARA.

MR. WICKHAM'S B. MODEL AT PERADENIYA.

One of Mr. Wickham's smoke curing machines, the first to be introduced into Ceylon and the East, has been erected at the Peradeniya Experiment Station for the purpose of submitting it to a trial of six months or a year with latex from a definite amount of trees set apart for that purpose. Visitors to Peradeniya interested in the various processes of coagulating and curing rubber should make a point of studying the working of the smoker and the resulting rubber.

Difference Between Coagulating and Curing.

Mr. Wickham draws a clear distinction between the process of coagulating rubber by means of reagents as practised in the plantations of the East and the curing of hard Para in the virgin forests of the Amazon; his contention being that with hard cured the whole of the latex is treated and becomes transformed into an amalgam with the essential oils of the smoke; whereas with cagulation part of the latex is separated out in the liquor; and that thus hard cured Para contains certain natural constituents absent in plantation rubber which may account for the qualities of durability and toughness for which it is particularly noted.

The Process.

For curing hard Para the Brazilian tapper builds a small oven-like furnace with a hole at the top for the issue of smoke and over this hole close to the heated smoky orifice he suspends his mould, usually a round piece of wood, in the smoke until the surface is well heated and becomes covered with condensed oils from the smoke. He then swings it over the latex tank and with a dipper pours the latex over the mould playing the latter so that it gets evenly covered with a thin coating of latex. He then swings back the beam, which is often suspended by a rope from a support above, over the hot, smoky blast, after a few moments' contact, returning it again to receive another floating film from the tank. In this way a block is built up of 10 to 100 or more pounds in weight. The pressure exerted by each additional superimposed layer is an important agent of manufacture. The lump may be left for a few months or a year or marketed at once.

B. Model.

Mr. Wickham has made three machines for mechanically imitating as nearly as possible the methods of the Brazilian; B. model now erected at Peradeniya being the one he is disposed to favour most. It consists of an upright revolving disc-cylinder adapted to carry the latex so that it can be brought into contact with smoke issuing from a flue leading from a small furnace charged with smoke producing fuel such as coconut shells and husks; the object being to generate hot smoke, not flame. On the Amazon the seeds of the Maximiliana and other palms are used. We have had *Maximiliana regia* at Peradeniya for forty years. A small tank for the separation of the latex is mounted so that the latex can flow through a tap at the bottom on to the flange of the disc-cylinder which, as it revolves, brings it into contact with the smoke. It is very necessary that the extremity of the flue should be set close enough so that the smoke issuing from it shall not have cooled down below a temperature of from 150° to 200° F.; heat being also an important agent in the process.

Objects of the Peradeniya Trials.

No opinion is expressed as to the suitablity of B. model for plantation use or even of the practicability of imitating the methods of the Brazilian curers to meet the needs of the market. The latex will be measured daily as it is believed that the resulting weight of rubber will be proportionally greater than that derived from the coagulating method. In the first place, though a certain amount of moisture is evaporated by the hot smoke the loss is probably not so great as that suffered by coagulation and subsequent drying of crêpe. With Mr. Wickham's process, as with hard Para, the rubber is not dried; decompositon being prevented by the antiseptic oils absorbed in the smoke. This is an obvious advantage as much factory space is saved. Another is a saving in expensive washing and creping machinery. The rubber is taken from the smoker, put into a press for 24 hours and is then ready for the market. It is better perhaps to keep it under pressure for a longer period though it is not necessary. It has been questioned whether large quantities of latex such as are daily collected on plantations of size could be dealt with and this is a point for investigation. It would seem to be a matter of increasing the diameters of the disc and arranging batteries of them mounted close together on single shafts; and of having them built in sections so that they could be rapidly opened for the liberation of the rubber.

In acknowledging a sample of hard cured he recently sent home from Ceylon, a correspondent sent Mr. Wickham the following observations:—"It does not convey the impression to my mind at present as being equal to fine up-river hard, but I don't state that this is so because the size of the sample is insufficient for the purpose of a real test. That is the impression; at the same time the lines you are working upon are entirely sound and if an economical process can be devised whereby our Rubber can be turned out in large quantities under somewhat similar conditions of manufacture to that in vogue on the Amazon, I believe it would be a great step foward in increasing the tensile strength of the article produced. Many manufacturers have told me that good well-prepared Smoked Sheet from the Middle East is as good if not superior to so called Hard Fine, but the great point is that the latex produced from trees grown in the Middle East is quite as good if not better than that produced by the forest trees of the Amazon. This being so the question of improved manufacture is only a matter of time, and I am of the opinion that the best line of advance is in the direction in which you are working." The writer is a well known London authority whose opinions are entitled to respect.

SEED IN PADDY CULTIVATION.

The following observations by Agricultural Instructor N. Wickramaratne on the paper read by Mr. W. A. de Silva at the meeting of the Board of Agriculture on 10th September, 1912, will be found of interest:—

Selection by Sorting.

This is essential not merely to separate the light from the heavy grain but also to secure purity of seed. The sowing of mixed seed is a common practice which is by no means economical, though the cultivator, by grudging the time and trouble necessary for the elimination of the adulterating grain, thinks he is gaining something. One frequently meets with mixed paddy crops resulting from this carelessness in sowing. Recently I had to procure a special variety of seed paddy which I found adulterated to the extent of 30 % with an inferior variety.

Change of Seed.

Very careful consideration is necessary before deciding from what districts seed should be introduced. For instance, seed of a variety which is of one "age" in a district like Kurunegala will not mature within the same period in the Ratnapura district (owing to the latter place being so much wetter), and *vice versa*. Early or late maturity means a great deal since it may result in attack by the paddy fly, or damage by cattle which are generally let into the fields after the bulk of the crop is reaped. This points to the necessity of making trials before recommending particular changes of seed.

The whole subject of varieties requires study and a classification to work upon is needed. At present no definite information is available and the experience of the *goiyas* is the only guide; and there is often a difference of opinion even among them.

Production of New and Better Varieties of Seed.

A point that strikes me in this connection is whether, if the breeding of special varieties of paddy is carried out, say at the Experiment Station, Peradeniya, we could count upon the qualities being constant under all conditions of soil, elevation and climate; that is, whether the seed will breed true to type in Jaffna, Mannar, Batticaloa, as well as Nawalapitiya, Welimada and Ratnapura. This is a point upon which I should like to have the views of experienced men.

With a view to deciding many important points connected with this question of seed in paddy cultivation, it is advisable that the Society should establish its own paddy experiment stations in typical districts with the object not only of trying different methods of land-preparation, tillage, sowing, manuring, etc., but also of testing various kinds of paddy likely to prove suitable to specific districts so as ultimately to be in a position to establish seed-farms such as are to be found in India.

OSTRICH-FARMING AT COONAMBLE.

The *Agricultural Gazette* of New South Wales for September, 1912, has an interesting account on the above, from which we quote the following extracts :—

The birds can be mated for breeding at about the age of three years. They are mated in equal proportions and the hens lay about sixty eggs per head per annum. They lay every second day in the season, and if the eggs are not removed from them they begin to sit and the laying is reduced. One pair of birds on an acre of lucerne should give at least thirty chicks per annum with natural hatching. Nesting commences in July and hatching proceeds until February or March. It takes six weeks to hatch an ostrich egg.

It is expected, however, that birds penned up will hatch practically all the year round. The largest hatch so far obtained in one year has been 250, but as many as 50 have been lost in one week from wet weather.

The age to which the birds will breed is unknown; though a hen hatched in South Australia in 1893 is still the best breeder at "Nardoo."

The practice is not to pluck feathers from the ostriches until they are nine months old. Some say that feathers can be plucked at seven months and on one occasion Captain Cairnes attempted it at six and the sockets bled, with the result that he never got good feathers from those birds afterwards.

The Plucking Pens.

These are so arranged that seven birds can be put into a pen together and driven one at a time into a "crush" to have the feathers cut. Old birds stand quietly during the operation but the young ones kick through fright. As a kick from an ostrich is a very vigorous one, a cap is put over the bird's head before it is driven into the crush. When in the crush one man removes the tail feathers and two others the wing feathers. Cutting off feathers gives no pain to the birds and it would be against the owner's interest to give pain to the ostriches by pulling the feathers out as the sockets would bleed and succeeding crops would be seriously handicapped.

An ostrich will give three cuts of feathers in two years though the time can be hastened by liberal and nutritious feeding. It is not advisable, however, to hasten crops. Some South African farmers only pluck once a year.

In the feather-room the crop is graded for sale. The large snow-white feathers bring the best price—£25 to £30 per lb., and the black and white ones bring about £18 per lb. Black feathers are less valuable. The small "floss" feathers, obtained from three rows under the wing, may be used for various purposes such as making feather dusters, but are not of much value.

PRACTICAL VALUE OF SOIL ANALYSIS.

The Journal of the Board of Agriculture for September in an article on this subject states that:— In most cases the idea appears to be entertained that having a soil analysed is ready means of obtaining an indication of its fertility and a discussion as to how far this view is correct may therefore not be out of place.

The fertility of the soil may be defined as its power of growing crops and while this depends to a great extent on the soil's ability to supply the crop with what is often termed plant food, particularly nitrogen, phosphoric acid and potash in a suitable form, this is by no means the only essential condition. Even if the analyst could give complete information about plant food and were able to measure accurately the mechanical condition of the soil, the information obtained in the laboratory could only give a very incomplete idea as to the fertility of any particular field and the farmer would have to supplement it by his own local knowledge, experience and judgment.

The Limitations of the Analyst.

Although the analyst is unable at present to give more than very rough and incomplete information even about those factors influencing fertility, some of the difficulties with which he has to contend may be mentioned here. He can determine as accurately as need be the total amounts of nitrogen, phosphoric acid and potash in the soil and it has been found that, even where external factors, *e.,g.*, climate, depth of soil, etc., do not enter into the case, there is often little or no connection between these amounts and the soil's manurial requirements. Most of the plant food, however, is is an unavailable or locked-up condition and is only gradually set free or made available.

In the case of phosphates and potash, a method has been devised of roughly measuring the amount which may be regarded as of immediate or prospective value to the plant by finding, not the amount of phosphates or potash present, but the amount which is dissolved out in a given time by a weak solution of citric acid. This method gives results which in many cases indicate fairly well whether a particular soil will respond to applications of either of the two kinds of manure. At the same time there are many cases where the results obtained are at variance with those obtained by actual experiment in the field.

The Best Manure for the Land is the Master's Foot.

Two conditions essential for the satisfactory growth of crops are a sufficient supply of water and the proper aeration of the soil. By carrying out a "mechanical analysis," the proportions of particles of different degrees of coarseness can be measured, and as the results of such analyses accumulate it will probably become possible to estimate from such an analysis such factors as water retaining power, ease of drainage, ability to withstand prolonged drought, etc.; and even to say with some degree of certainty what systems of cultivation are most likely to result in a good tilth at any particular time of the year, but in most cases an ex-

perienced farmer would be able to gain more useful and accurate information by walking over the land and examining it carefully at different times of the year.

Chemical and mechanical analyses of soils are of little practical value except in a few special cases. An intelligent and local farmer could give a much better idea of the fertility of any particular farm than an analyst.

SCIENTIFIC BREEDING.

Through the munificence of Capt. Dealtry Part of the 21st Lancers who placed a sum of £10,000 at the disposal of the British Board of Agriculture, it has been found possible to initiate some important experiments in light-horse breeding in England. The work is under the control of Capt. Part in consultation with Major C. C. Hurst and Mr. F. W. Carter, and will be carried out on Mendelian lines, with the approval of Prof. J. Conar Ewart.

In order to secure certain results, *i.e.*, uniform offspring, and reduce the production of "misfits" or irregular progeny to a minimum it will be necessary to employ what are known in Mendelian language as "homozygous parents," *i.e.*, pure breeding stallions and mares; but these can only be discovered by experiment. Once found, however, the strain or breed will be permanently established.

The details for the working out of a scheme calculated to produce the most desirable strains are in the hand of Professor Ewart and Major Hurst.

If in the end, says *Horse and Hound*, anything approaching the success achieved (by working on Mendelian lines) at Cambridge in increasing the production of flour in wheat and enabling it to resist disease, and improving the qualities of sheep and other animals, can be equalled by these experiments with horses, to Capt. Part will belong the honour and credit of laying the foundation of a great enterprise.

Horse breeding has never attained any importance with us and we have not heard of any practical steps being taken with a view to creating a local supply of horses suitable to our needs, though private enterprises in this connection have been freely talked about. But where there is scope for some definite action is with regard to the improvement of the cattle of the country. There are many excellent qualities in our indigenous stock which it should be the object of the breeder to fix in combination with other desirable points that could be introduced by a judicious experimenting on Mendelian lines.—*The Veterinary News.*

We understand that the Government Veterinary Department is about to start a breeding farm in the neighbourhood of Ambepussa railway station. This establishment should offer immense facilities for such work as has been indicated above.

HOLLOW TREES.

BY W. J. BEAN.

There is no doubt that hollow places in the trunks and limbs of trees formed by decay are better filled up. If the cavity be a large one the appearence of the trunk is thereby improved, and if it be small and properly treated decay is often arrested and new bark encouraged to grow over the filled up cavity. It prevents the entrance and accumulation of moisture, and thereby removes one of the chief predisposing conditions of decay.

Tha majority of such decayed hollows have their origin in snags left by branches broken off that have rotted back into the trunk because the new bark has not been able to grow over and seal up the wound. Branches removed by design, or broken off by wind or accident, should always be sawn off close to the trunk, and the sawn surface should then be coated over with ordinary coal tar. If a snag or stump is left the bark cannot grow over it; damp, fungoid parasites and decay sooner or later follow and gradually find their way towards and eventually into the trunk. Such is the most frequent beginning of cavities in the limbs and trunks of trees. The coating of tar renewed every two or three years, makes the wound watertight and fungus-proof; its object being to serve as a temporary bark until a new natural covering is formed. It is certain that the life of many trees, historically famous or otherwise notable, might be much prolonged if a close watch against the intrusion of decay into the trunks and main branches was maintained.

With regard to hollows that have already formed, the following treatment is recommended:—First clean out all the decayed materials, especially the soft brown crumbling wood and the soppy mass frequently found at the bottom. Sound dead wood that has become dry and hard does not matter. Then wash the surface of the wood that is left exposed with a strong solution of carbolic acid. After allowing this a day or two to dry, a good thick coating of ordinary tar should be laid on. This antiseptic treatment is intended to destroy as far as possible fungoid parasites. It now remains to fill up the cavity. If this be a small one Portland cement may be used, and for round holes like those made by wood-peckers a plug of oak cut to fit will do. But if the hollow be a large one, the aid of the bricklayer may be obtained. After the bricks are laid the whole should be surfaced with cement. In the case of black trunks lampblack may be mixed with the outer layer of cement or it may be dusted over thickly with soot whilst wet. An intelligent workman may be able also to imitate the characteristic corrugations or markings of the trunk.

These, however, are mere refinements. The chief points are, the keeping out of moisture and the provision of a surface over which the new bark may grow. If a tree is in a state of vigorous growth, as many hollow trees are, the bark will in time close over the "stopping." But unless some surface is provided on which the new wood can set itself it forms thickened rolls. In very hollow trees open on one side a curious spiral growth of wood is sometimes seen in place of these thickened rolls which is due to the new wood continually being deposited on its own inner surface. A

remarkable example of this curious growth is exhibited in No. IV. Museum at Kew, presented by Lord Iveagh. It is a section of elm trunk that was so hollow as to be merely a shell a few inches thick. On one side of the trunk was a longitudinal slit. The tree appears to have a good growth and to have made vigorous efforts to close up the opening, but having no surface on which to deposit the new wood and bark and thus bridge over the gap between the two lips, it eventually formed by its continual growth on the inner side two remarkable spirals suggesting a pair of scrolls.—(*Kew Bulletin.*)

TRANSPLANTING EARLY RICE.

The following is a descriptive account by Mr. C. M. Conner, which appears in the *Philippine Agricultural Review* for October, 1912:—

In transplanting early rice the people near Calauan, Laguna Province, save from twenty to twenty-five days by sowing the seed rice on banana leaves in the following manner: the seed-bed is prepared in the usual way by puddling the ground thoroughly; then laying the banana leaves over the surface and sinking them until just enough mud runs in upon the leaves to cover the seed which is to be planted. The seed of some early variety is soaked for thirty-six hours in water in order to hasten the sprouting. The seed is then spread over the banana leaves about 1 centimeter deep. In twelve or fifteen days, the young plants are about 8 or 10 centimeters high and have formed a thick mat over the banana leaves. As the young plants cannot take deep root on account of the banana leaves, the plants may be easily separated without breaking the tender roots. Rice may be transplanted in this way at twelve or fifteen days of age, whereas if planted in the regular ways the plants must be thirty or forty days old or the tender roots will be broken off in pulling the plants from the seedbed and many of the plants will not survive when transplanted to the field, resulting in an imperfect stand.

SHEA BUTTER.

The following is from a note by Mr. O. W. Barrett in the *Philippine Agricultural Review* for October, 1912 :—

This commodity of the West Coast of Africa has been for many years a rather important item and though it does not at present enter largely into foreign commerce it is expected with the rapid improvement in transportation to find its way into European markets. This vegetable tallow is prepared from the seeds of a large tree, *Butyrospermum parkii.* This tree and the cousin species *Pentadesma butyracea* are represented in India by the famous Mahwa, *Bassia latifolia*, which produces vast quantities of dried flowers used in the making of alcoholic liquors, the oily seeds yielding a greenish lard-like butter. The Shea butter of West Africa is used in cooking, as an illuminating oil and as a sort of unguent panacea. The exports in Nigeria have from 1906 to 1909 increased from 2,000 to 9,000 tons and besides this amount 150 tons of the pure butter were exported in 1910.

The Shea tree, it should be remembered, does not exist in the area occupied by the West African Oil Palm—the great rival in that continent of the coconut.

MILK OF INDIAN BUFFALOES.

In a mixed herd of buffalo cows, in Western India, and composed of animals of the *Surti, Delhi, Deccani* and *Jaffarabadi* breeds—the number of cows of any one breed naturally varying from time to time, but with the *Surti* generally predominating,—the composition of the milk may be considered as fairly constant. The morning milk will contain between 6½ and 8 per cent. of fat, and the evening milk between 7½ and 8½ per cent. Under the conditions of the Poona Dairy Farm, where green fodder is grown and fed throughout the year, there will not be a very large drop in fat content in the rains, though such a drop is obvious, more especially in the evening milk.

As with cows, the mixed evening milk is always richer than the mixed morning milk, the difference in fat content being from 0·3 to as much as 1·5 per cent. The "solids not fat" in the morning and evening milks are substantially identical in amount.

The Surti Buffalo.

The average composition of mixed buffalo milk of the breeds at the Poona Dairy shows a fat content as follows :—

Morning milk	...	...	...	...	7·1 %
Evening ,,	...	...	...	...	7·9 %

The milk of the *Surti* breed is richer than the above figures for mixed milks, and the fat content gives average figures as follows :—

Morning milk	...	...	...	...	8·3 %
Evening ,,	...	...	...	...	8·5 %

There seems little relationship between the composition of milk of individual animals of the *Surti* breed and the yield, except that the milk becomes slightly richer at the extreme end of the period of lactation. Apart from this, the milk yielded by a single buffalo does not seem to vary according to the amount of milk it is giving.

The average length of lactation for the *Surti* buffaloes is 53 weeks, but this varies very much,—from 32 weeks to 67 weeks.

The yield of milk from a buffalo during the lactation rises to a maximum almost at once, and remains almost constant for about the first two-fifths of the lactation period. After this there is a regular and steady decline to the end of the lactation.—(*Memoirs of the Department of Agriculture in India—August, 1912.*)

THE COCONUT PAVILION.

The Pavilion made of coconut wood erected by Mudaliyar A. E. Rajapaksa of Negombo at the All-Ceylon Exhibition, which with other exhibits won the cup for the best exhibit of the products of the Coconut palm, has been presented to the Royal Botanic Gardens, Peradeniya, and has been re-erected near the ferry where it commands a fine view of the river and will afford shelter to those waiting to cross.

SISAL HEMP.

With the gradual but constant demand for a supply of good commercial vegetable fibres, whether for textile, ropes, cordage or other purposes, there would seem to be a promising future for so valuable a fibre plant as the Sisal Hemp (*Agave rigida* var. *sisalana*). This plant furnishes the commercial and well-known Sisal hemp from its leaves, and has been in recent years somewhat extensively cultivated in South America, Hawaii, as well as in British, German and Portuguese East Africa. It bears long thick, succulent leaves, 4 to 6 feet in length, usually smooth-edged and ending with a terminal spine. The flowering or "poling" (from the fact that the inflorescence is produced on a long upright pole, 10 to 12 feet in height, which springs from the heart of the plant) takes place when the plant is about 7 to 8 years old. "Poling" affects the quality of fibre; therefore in order to preserve the latter the "pole" should be cut at about 3 feet from the ground, all ground suckers being also removed for the same purpose. If desired for propagation, however, the flowering pole should be allowed to grow, when on an average it will produce from 2,000 to 3,000 bulbils. The latter are an interesting provision of nature, since the plant produces no seed.

When collecting the leaves for fibre the lower and older ones are taken first. This usually takes place in the third or fourth year from planting, when, under favourable conditions, an average of 25 leaves per annum may be obtained from each plant. Subsequent cuttings may be made at intervals of about six months until the plants have reached an age of about 8 years when, it is considered, the plants should have furnished a total average of about 250 leaves. The plants then cease to be productive, and the ground should be cleared and replanted. It is, however, stated by some planters that a plantation may be maintained in a remunerative condition by merely removing the stumps of the old exhausted plants and thinning out the suckers to the requisite number, but this method is not considered satisfactory.

With regard to yield, an experimental plantation formed in the Madras Presidency, "on a poor, red, gravelly soil," with a rainfall of 23 inches, and concluded in 1911, is officially reported to have given an average yield of $3\frac{1}{2}$ per cent. of fibre, the total return per acre (for 900 plants) being about 300 lbs. Sir Daniel Morris, however, estimated a return of 60 lb. from 1,000 plants, while as much as 800 lbs. per acre has been recorded in an American report on Sisal hemp in Hawaii.

The plant will thrive in either a dry or moderately wet climate and is not exacting as to soil, though the best returns are produced on good loamy land. It may be said that soil which would be too poor or dry for most other crops would suit the Sisal hemp plant. On average soils the suckers or bulbils may be planted at distances of 8 feet by 5 feet giving 1,089 plants to the acre. In the Madras plantation above referred to plants were spaced at 8 feet by 6 feet apart, that is at the rate of 900 plants to the acre.

H. F. MACMILLAN.

GIRTH MEASUREMENTS OF HEVEA.

The following short account of the experiments made by Mr. F. G. Spring in three small plots of rubber at Kuala Lumpur on girth measurements is from the *Agricultural Bulletin* of the Federated Malay States.

The jungle was felled and burned during February and March of 1907 and all timber removed from the land. Each plot was planted with six months old stumps at distances of 12½ × 25 feet; the stumps being more or less of similar size. Plot (1) referred to in the table given below was *changkolled* every month to a depth of 2 to 3 inches; plot (2) once every three months to a depth of 6 to 7 inches. In plot (3) seed of *Terphrosia purpurea* was drilled in rows 3 feet apart in the beginning of January, 1910. The tephrosia was pruned on an average twice in a year and the land surface weeded when the lalang grew to a height of 12 to 16 inches. In August, 1912, the girths of all the trees were taken at a distance of 1 foot from the base of the tree.

The results obtained are as follows :—

No. of Plot.	Treatment.	No. of Trees in Plot.	Date of Planting.	Date of Girth Measurement.	Total Girth of Trees.	Average Girth of Trees.
1	Weeded once each month ..	107	December 1909	August 1912	inches 985	inches 9·2
2	Weeded once every three months ..	107	1909	do	do	6·5
3	Tephrosia purpurea ...	107	1909	do	do	5 8

It will be seen by referring to the table that the trees in the land weeded every month have an average girth of 9·2 inches while the girth of the trees in the plot weeded every three months have an average girth of 6·5 inches. Comparing those two plots, there are probably two factors which affected the growth of the trees:—(1) extent of cultivation and (2) the amount of weeds present in the respective plots. I am rather of opinion that the greater girth obtained in plot (1) is chiefly a question of cultivation.

The objects of cultivating a soil are:—to allow the air to enter the soil and thus promote oxidation; to allow vegetable and mineral matter to decompose more rapidly and supply plant food; to loosen the particles of a soil and mix them; to allow air and water easy access to roots and the soil; to promote absorption of moisture and gases from the atmosphere; to encourage the growth of bacteria which help in the formation of nitrates; to check the growth of anærobic bacteria which promote the liberation of free nitrogen from nitrates; to allow the roots to penetrate easily into the soil.

The climate may affect the soil to a small depth rendering it hard and inert, a state which I am rather of opinion does exist, in which case merely turning over the surface layer is promoting fertility.

RUBBER GROWING AS A VILLAGE INDUSTRY.

To the Editor of the *Tropical Agriculturist.*

Dear Sir.—The enomous fortunes that are being acquired through rubber cultivation and the adaptability of the rubber plant to low-lands hitherto under paddy has suggested the question whether it would not be worth while to encourage the paddy cultivator to grow rubber instead of such little-paying products as paddy, so as to give him the opportunity of participating in the present prosperity of the planting community.

The prospect which the proposal holds out is, of course, very bright. If an acre of paddy is taken to yield 30 bushels worth Rs. 60, or, taking two crops a year, 45 bushels worth Rs. 90, the annual profit per acre will approximately be Rs. 25 or Rs. 40 respectively.

On the other had rubber in its fifth or sixth year should give a profit of Rs. 150 or Rs. 200 and a few years later at least Rs. 300.

The difficulties in the way of the paddy cultivator giving up his field to rubber growing are:—

(1) The possession of land by more than one owner and the difficulty of getting all to agree to any new departure from existing customs.

(2) The hesitation on the part of cultivators, who are men of small means and ideas, to venture upon any new and comparatively large undertaking.

(3) The inherent attachment to paddy cultivation.

(4) The cost of converting paddy into rubber fields.

(5) The lack of capital on the part of the *goiya* to keep himself and his family provided with food and other necessaries of life and to cultivate and maintain his rubber land for five to six years until it begins to yield a return.

If villagers can be induced to form themselves into co-operative credit societies and take advantage of the provisions of the Co-operative Credit Ordinance, they should be able to get over the financial difficulties which the proposal presents. The debts contracted will, of course, have to wait for repayment till such time as the rubber comes into bearing, so that it will probably take eight or ten years before the cultivator will possess an uncumbered property and a respectable and steady income for, taking Rs. 300 as the cost of bringing an acre of rubber into cultivation, it will be at least seven years before that sum could be recovered.

Whether the ordinary small field-owner is capable of the sacrifice of his ancestral paddy field is, I think, doubtful.

Owing to these obstacles it will be only possible for a stray individual who is less conservative and more enterprising than the generality of his brethren to rise to the occasion. There are cases (chiefly in the Kalutara district) where the *goiyas*, carried away by the rush into rubber around

them, have planted rubber on such high land as they possess in conjunction with their paddy fields. This I think is the direction in which further progress is possible. If without disturbing his present vocation as a peasant who is employed in making (with difficulty) a living out of his ancestral land by growing the food crops necessary (often only partially) for feeding himself and his family, the *goiya* can improve his circumstances by growing rubber on a small scale on his *owiti* lands, boundaries and bunds, he will be doing as much as is possible in taking advantage of the opportunities presented to him.—Yours faithfully,

N. WICKREMARATNE.

THE BRITISH ASSOCIATION AND AGRICULTURE.

The British Association has raised Agriculture to the dignity of a Section. The significance of this announcement may not be fully understood by all Agriculturists nor indeed is it quite capable of explanation in view of the fact that the British Association is one for the advancement of Science.—("The British Association for the Advancement of Science.")

It marks, in a way, an epoch: suggesting the question: Has the British Association neglected its duty towards Agriculture? We suppose that four-fifths of the human race are engaged in Agriculture and that alone might have been considered as sufficient claim for recognition. But Agriculture has not lagged behind other Sciences in achievement.

It can point to the great merino wool breeding industry of Australia and New Zealand and the perfection of texture, staple and cover that has been accomplished; to the stables and stockyards of England; the vineyards of Europe; the cotton fields of America; the products of the tropics. It can claim to have followed the explorer into the dark continent and to be converting its vast wastes into farms and plantations, and to be compelling the fertile fallow soils of Asia to produce what had previously been considered a monopoly of undisturbed nature.

These and other triumphs have been won without any assistance from the British Association for the Advancement of Science. It is indeed a great step that the British Association has at length recognised Agriculture; it will be a greater when Agriculture can look to the British Association for guidance.

DUMBARA TOBACCO.

London Brokers' Report.

On the 24th of August last a sample of the Dumbara Tobacco grown in that district from the Sumatra seed was sent to Peradeniya and forwarded to Messrs Gray, Dawes & Co. of London for a Broker's report. The following has now been received:—

London, September 30, 1912.

We give you below copy of Brokers' report and valuation on the sample of Tobacco forwarded, in accordance with your letter of 26th August last:—

Ceylon Tobacco.—This is a well grown leaf of good texture, but the colours are too red and the flavour and burning not suitable for cigar use. Sumatra and Borneo are the principal leaf now used and it is impossible to displace these growths. For cutting purposes it is a little too thin, but it might find some favour if at a cheap price of 4d, to 5d. per lb. packed in dry condition.

COTTON.

Long-staple Cotton as an Irrigated Crop.

The possibilities of producing long-staple cotton are worthy of a careful consideration and the popular idea has been that the production of a long, strong fibre was necessarily limited to regions with a humid atmosphere. In reality, however, the production of fibre of high quality does not depend upon atmospheric conditions, at least to any such extent as has been supposed. A high degree of atmospheric humidity is unnecessary so long as the soil affords an adequate and readily available supply of moisture. A dry atmosphere is injurious if it renders the supply of moisture in the soil inadequate and thus reduces the plants to a condition of drought. It is possible, with the soil of a right texture and a supply of moisture, to produce cotton of a high quality and this has been conclusively shown in experiments with Egyptian cotton in Arizona and South California.

The general tendency in irrigated districts is the excessive use of water, the ability of the cotton plant to resist drought being underestimated. The crop is easily injured by the use of too much water, especially in the earlier part of the growing season.

To raise short-staple Upland cotton on irrigated lands where Egyptian or long-staple Upland cotton can be grown is a waste of agricultural resources. It is admitted that short-staple cotton can be produced and marketed with less difficulty and by more careless methods.

Conclusions.

Improved varieties of American Upland cotton bred by the Department of Agriculture and sent out through the Congressional Seed Distribution are being utilized for the improvement of the cotton industry.

One of the new varieties from Mexico, called Durango, is the most promising Upland long-staple cotton for irrigated districts.

Cotton-growing communities have much to gain by co-operative organization for the production and marketing of a single superior variety of cotton.

Cultural methods are suggested for avoiding malformations of young seedlings, which often delay the development and reduce the yield.—*Circular of U. S. Department of Agriculture*, July, 1912.

CHINESE CABBAGE.

Seeds of two varieties of this vegetable were forwarded from Peradeniya to the Government Stock Gardens in March last, the seeds being distributed through the Ceylon Agricultural Society among nineteen School Gardens. The following thirteen schools reported that the growth had been satisfactory:—Yatawatte, Idamegama, Morape, Nugawela, Palugama, Munwatte, Panwila, Mahamedegama, Teldeniya, Alawatugoda, Tenna, Welimada and Gunnepana.

The plant is a very acceptable addition to native food crops and is appreciated as such.

OSTRICH FARMING.

The following extracts are from a paper on Ostrich Farming by Mr. W. J. Slatter of Natal printed in the *Queensland Agricultural Journal* of June 1912:—

The first work was to make for the four pairs of birds four 5-acre paddocks—wire interlaced with bush. Half an acre was planted with lucerne, quarter acre cabbages and root crops, the remainder being used for mealies and forage. In every paddock there should be running water, wood ashes and a box of crushed bones.

Hatching.

As soon as one or two eggs are laid, a round hole 2 yards wide and 18 inches deep is dug close to the eggs and the hole filled in level with coarse sand or gravel. A few days later the eggs are moved on to the nest. The ostrich cock does most of the sitting on the nest. The eggs being hatched the chicks are left with their parents for three or four days and then removed. Some breeders take away the chicks immediately they are hatched; but it is best that they should receive the initial care of the parents as they become stronger and more robust.

Early Life.

For five or six days the chicks are kept in a small enclosure—20′ × 12′. They must have plenty of clean water, river sand, crushed bones and wood ashes in which to clean themselves. Lucerne is the best and only food required by the young chicks. It must be quite fresh; if stale and fermenting it will certainly kill them. An umfaan is their constant attendant and teaches them how to feed by working his forearm up and down, the wrist bent and the end of the pointed fingers just touching the food.

After the fifth or sixth day the brood should be put into a wire-net enclosure of about 20′ × 20′ on lucerne. The umfaan still remains with them and the picking motion with his hands soon teaches them to pluck the leaves themselves. The enclosure should always be shifted on to fresh lucerne after a few days' feeding.

In wet and cold weather the chicks are put into paddock boxes partially covered over with sacks where a screened fire is burning. Chicks which have once suffered badly from cold and wet weather are always delicate in after life.

Plucking.

When the chicks are a couple of months old they may be taken among the mealies. Two months later they can be sent to graze on the veld, but until they are about six months old they should be sheltered every night. Arrived at this stage they require no night shelter. At 18 months the birds are thoroughly strong. They begin to breed when four years old and continue till they are twenty.

Chicks should have their feathers clipped when six months old, the stumps being drawn out two months later. The first plucking will be worth about 18*s*., and the next, taken six months after the drawing of the stumps, 30*s*. Subsequent pluckings will vary in value from £3 to £5.

THE USE OF QUEEN EXCLUDERS IN BEE-KEEPING.

Mr. J. A. V. Pereia of Regent Street, Colombo, who is an enthusiastic bee-keeper and does not favour the use of a queen-excluder between the brood-chamber and the super for *Apis indica* bees, is good enough to state his reasons and gives his own experience with regard to the matter :—

"I have never used any excluders, so I can't speak with experience. But I have been getting honey without brood or pollen in the combs.

"All authorities seem to agree that excluders induce swarming to some extent, and as our bees are great swarmers, we must be very careful how we use excluders.

"In fact, if we could handle the bees without excluders why need we trouble with them at all?

"Townsend who has several apiaries in America does not use any excluders in some of his apiaries, and he says he can get on very well without them.

"A beginner using excluders would find all his bees swarm, and give up the hobby in disgust.

"My method is as follows :—I place the brood-chamber on a hive containing empty frames right through the year, as this keeps the hive cool. At the beginning of the season the empty frames in the lower hive are replaced with drawn comb, and the queen descends to this lower hive and begins to fill it with brood. Then, when honey begins to come in, I place a super with drawn comb on top—that is on top of the original brood-chamber. And as this brood-chamber is already filled with brood, and as the lower one is being filled with brood, the honey has to go to the top super, and as there is no queen there the combs are free from brood or pollen.

"Once you get a super filled with honey you can place it directly over the brood-chamber containing the queen and place any number of supers on top. And the queen will never cross over the honey to go to the supers on top. In this way the super containing honey acts as a sort of excluder and keeps the queen away from the top supers which will only be filled with honey. And this is all done without placing any impediment in their way or in any way inducing the bees to swarm."

We shall be glad to have the views of other local Apiarists on the use of excluders.

PRESENTATIONS TO PERADENIYA.

Mr. V. M. Muttukumaru of Jaffna has sent to the Museum of the Royal Botanic Gardens, Peradeniya, a set of models, the gift of Mr. R. R. B. Kumarakulasinghe, Maniagar, Valigamam North, of the following agricultural implements:—plough, mammoty, catty, sickle, grass scraper and spade.

THE CLASSIFICATION OF RICE.

The classification of rice has baffled all those who have attempted the work. Among others may be mentioned Bretschneider, Roxburgh, Griffith, Louleiro, Henze, Sato and Inabu, besides Tanaka (father and son), Koerniche and Watt who contributed towards the work.

In a reprint from the *Journal of the College of Agriculture, Tokyo*, Prof. Kikkawa sets himself this great task, and gives one some idea of the enormous labour involved in the examination and description of an almost unlimited number of specimens.

In classifying plants, he says, we should consider morphological character, but at the same time we have also to examine their qualities from an agricultural point of view.

In regard to the matter of cultivation he considers the rice plant under the following heads :—

(1.) Aquatic and upland, or, as we should say here, wet land and dry land paddy, the former (as in Tissa) depending chiefly upon a liberal supply of irrigation water, the latter (as in Jaffna) depending on a comparatively scanty rainfall. The author is inclined to the belief that these two classes of rice were at one time the same but acquired special characters as the result of continuous cultivation under special conditions.

(2.) Early and late rice, so named according to the difference of season of growth or days of growth. This is what is spoken of locally as the "age" of paddy which generally varies from 2 to 6 or even more months.

The defect in this detail of classification is that it cannot be applied to all the rices of the world or even to any one country with widely different climatic conditions ; but in circumscribed areas it is useful.

(3.) *Giant rice.* The kinds falling under this head possess the natural character of growing high and keeping above the level of rising water. The author quotes Sir George Watt to the effect that in India some of the Boro (or swamp) varieties grow to a length of 10 to 15 feet, and that the grain is harvested by means of boats.

(4.) *Salt rice.* The varieties in this class have the power of withstanding the effects of salt when the fields become inundated by, or are irrigated with, saline waters. Such rices should prove of the greatest utility if introduced into certain parts of the Jaffna peninsula, Jaela, and elsewhere.

(5.) *Tall and Short rice.* The author calls all the forms that exceed 1·7 metre tall rice and those which fall below one metre short rice. He further associates height with tillering power and weight of ear and *vice versa*. Incidentally he mentions the "dwarf rice" which does not reach 2/3 metre in height.

(6.) *Awned and Awnless rice.* This he refers to as one of the most important distinctions in rice. According to Watt, who bases his conclusion on chemical analysis, the value of rice depends upon the absence of the awn and colour.

In addition to the above points the author suggests that the colour glumes and awn, colour cf stem and leaf, length of flower, number of ovaries, form of panicle, colour of stigma, &c., might be made use of as marks of distinction.

In the classification according to utility we find the following sub-divisions—(1) non-glutinous and glutinous, (2) long grained and short grained, (3) large, medium and small grained, (4) white and coloured, and (5) scented rice.

We hope in an early issue to give an enumeration of the recognised varieties of rice in Ceylon, classifying them according to their age or length of growth.

FORESTS AND RAINFALL.

Nature of August 29th has an interesting article on the above subject. Sir W. Schlich defines a forest as "an area which is for the most part set "aside for the production of timber and other forest produce, or which "is expected to exercise certain climatic effects, or to protect the locality "against injurious influences."

The strongest arguments in favour of the supposed influence are based upon observations at so-called "parallel" stations: *i.e.* meteorological stations are established within a forest area and in the open country round the forest and a series of simultaneous observations are made at all the stations. An appreciable difference exists between the rainfall measured inside the forest and that measured outside, in all localities where such observations have been carried out; the forest station having an excess precipitation over the "parallel" station. Schubert has shown that a forest station in West Prussia and Posen has from 2 to 10 per cent., and in Silesia from 2 to 6 per cent. more rainfall than a parallel station in the open country. From this it is argued that inasmuch as a forest increases the rainfall over its own area, it may be expected to produce some effect of the same kind in the surrounding districts, as the wind would carry forward the rain-bearing clouds condensed by the forest influence.

American Opinion.

Certain American meteorologists have, however, strongly criticised the observations derived from parallel stations. Professor Cleveland Abbe has urged that the results are vitiated on account of the fact that a rain gauge exposed in a forest clearing is not subjected to winds as strong as those that pass over a gauge at a parallel station in the open country; and in consequence the forest gauge may be expected to record more rain although the real fall my be indentical in both places. As a result of this investigation Professor Abbe is of opinion that there is no appreciable difference in the rainfall outside and inside a forest.

Professor J. von Hann's opinion on the subject is that the question cannot be definitely answered at present and Dr. G. T. Walker, of the Meterological Office. Simla, is of the same opinion. He further states that if forests have any influence on the rainfall, it is probably not greater in India than 5 per cent.

THINNING OUT HEVEA ESTATES.

In an article on the above subject, the *India Rubber Journal* for October, 1912, says that in regard to the number of trees per acre Ceylon prefers to have the largest. Gentlemen connected with plantation work in the East have different opinions regarding planting distances, and in Malaya there is a general consensus of opinion that the number of permanent trees per acre should be 90 to 100. Mr. Harrison points out that it is not advisable to thin out to less than 115 to 120 in view of the inevitable loss that may be sustained from storms and diseases. Estates on good soils may be thinned down to 70 trees per acre. In Malaya and Sumatra the distance favoured appears to be 20 by 20 feet.

On good soils where no intercrops are cultivated one could not go far wrong in planting 20 by 20 feet. If intercrops are cultivated then rubber trees should be planted about 30 by 20 feet.

How to Thin out Estates.

Though there is difference of opinion on the subject of reducing the number of trees per acre, many agree in thinning out the bad and weak trees on uneven plantations and cutting out every alternate row on very even estates. In thinning out by the careful method of selection it is suggested that the backward trees, those with large burrs or those which have been badly tapped, should be selected for removal. Care should be taken to uproot those which have the shortest lives before them. A selection should be first made of the permanent trees rather than the weakest in order that the former may be retained and the latter destroyed on a regular system.

Lastly, about 100 trees should be aimed at permanently in average soil, a lower number in good soil and a higher number in poor soil; (2) thinning out should be done by the removal of backward or weak trees, and not cutting out every alternate row; (3) where money is badly needed, rubber should be extracted from the stumps before the bad trees are removed.

CROP AREAS IN BOMBAY.

The following are areas under crop according to the Memoranda issued by the Department of Agriculture, Bombay:—

		Acres.
COTTON.		
British Districts	... ...	1,469,000
Native States	... .	2,614,000
SUGARCANE.		
British Districts	... ...	43,000
Native States	... ...	23,000
GROUNDNUTS.		
British Districts	... ...	110,000
Native States	... ...	63,000
SESAMUM.		
Presidency.	British Districts	206,000
	Native States	450,000
Sind.	British Districts	65,000
	Native States	5,000

SOILS IN RELATION TO GEOLOGY AND CLIMATE.

This is the title of a bulletin issued by the New South Wales Department of Agriculture.

Determinations arrived at are the result of research made since April, 1909, by Dr. Jensen under the direction of Mr. F. B. Guthrie of the Chemical Bureau of the Department.

The object in view was to prepare a soil map, and to this end the investigators used the Geological map of the State as a basis. The analysis of the soil with a view to ascertain the soluble ingredients of plant food was made according to the Hydrochloric acid method. Over 2,300 soil samples were examined.

It would appear that ordinary soil analyses are often quite misleading to the farmer, though they are a valuable aid to the expert, especially when the Geological origin of a soil is known and the depth of the soil, climate and topography are taken into consideration. A knowledge of Geology and Mineralogy thus frequently enables a man to give as valuable an opinion after a short field inspection as after a complete tedious soil analysis. Every type of soil depends on three factors—Geological formation, climate and topography ; *i.e.*, the rocks from which the soils are mainly formed, the rainfall, distance from the sea, aspect of land, whether open or protected, and so on.

Geological Structure and Chemical Composition.

The result of investigations made in New South Wales clearly indicates this relation between geological structure and chemical composition modified by climate.

GRANITE soils contain a good percentage of potash, particularly where there is a minimum of leaching and an active evaporation of soil moisture. In wet districts the surface soil is much lower in potash than the subsoil.

BASALT soils are particularly rich chemically. Within costal areas with rugged topography they are richest in organic nitrogen and poorest (as the result of leaching) in mineral plant food.

While the granite soils are of the character of light loams under all climatic conditions, basalt soils vary from friable loam to heavy clay.

SANDSTONE soils are mechanically, more or less, uniform, and though slightly better as regards mineral plant food in some parts, are of a very poor description and are only workable under special treatment such as dry-farming, irrigation and manuring.

LIMESTONE soils, though they exhibit mineral differences due to climate, are rich in humus though containing less valuable matter than is to be expected.

In the case of ALLUVIAL soils though the effects of Geology are somewhat obscured, they are not wholly clouded. The character of the soil is governed by the nature of the rock which contributes the detritus, that is, the formation through a river draining. The effect of climate is more marked, inasmuch as the soils increase in mineral plant food as their distance from the coast increases—this being due to decreased leaching by rainfall. At the same time their moisture content and percentage of organic matter and nitrogen diminish.

Experiments.

It is recommended that Experimental Stations should be established on each important soil-type (*e.g.*, granite soils, sandstone soils, &c,). and the strength and quality of the soil tested by growing crops demanding a large proportion of the chief mineral ingredients of plant food. To test for quality of soil irrespective of climate and topography it is recomended that a soil should be tested with indicator crops grown in large pots at a central laboratory and compared with the same soil from other parts. The analyses of these would then indicate the nearest approach to experimentally-proved facts. Culture experiments could be carried out at the same time to discover the value of different fertilizers, as well as the action of bacterial cultures, bactericides, toxins and antitoxins.

The bulletin referred to is replete with valuable information regarding many points of interest to the cultivator of the soil, *e.g*,, colour, acidity, alkalinity and nitrification ; and accentuates the fact that fertility does not depend primarily upon the proportions of plant food present in the soil, but on a variety of contributing causes which have to be taken into account ; while soil mapping is essentially the work of the Geologist and Physiographer, who has at the same time given attention to the origin of soils and the agricultural needs of the country.

EXPORTS OF BRAZIL IN 1911.

Rio de Janeiro, 9th September, 1912.

The Editor of the *Tropical Agriculturist.*

SIR,—From the report of our Minister of Finance for 1911 I take the following table of exports :—

		Kilos.			Value £.
Cacao	...	34.994,087	...	...	1,641,381
Coffee	...	675,468,120	...	...	40,401,206
Cotton	...	14,646,909	...	...	978,998
Hides	...	2,797,909	...	...	647,564
Maté	...	61,834,446	...	...	1,983,209
Leather	...	31,931,698	...	...	1,798,781
Rubber	...	36,517,135	...	...	15,057,015
Sugar	...	36,208,301	...	...	408,659
Tobacco	...	18,489,122	...	...	965,375
Sundry	...		...	...	2,969,704
			Total	...	£ 66,838,892

The export of coffee (1,510 million pounds) is worth comparing with the whole industry of tea.

Brazil is now first country in the export of cacao.

Maté has quite a large trade, for Brazil is a small maté-producing country, yet exports over 130 million pounds, besides the great deal drunk here.

Of the tobacco 91 % goes to Germany.

I am, Sir,
Your Obedient servant,
JOHN C. WILLIS.

AN EGYPTIAN DATE PLANTATION.

The Financial Aspect.

The following is taken from an article by Sir H. Rider Haggard in a recent issue of the London *Times*. We believe the Arab Proverb should have been quoted as "The date palm, the queen of trees, must have her feet in running water and her head in the burning sky."

In April of the present year, whilst struggling back against a bitter wind from Sakhara to the Pyramids, just about the spot where the Sphinx comes into view, I observed on the further side of a low bank lines of many small tent-like shelters made of the dried stalks of Indian corn. At the time I wondered what was planted here which needed such protection in that climate; but as the objects of my visit to Egypt were archæological, not agricultural, and I was almost as weary as the jackass on which I rode, I did not stop to make inquiries. Some days later good fortune threw me into the company of Mr. G. L. Bailey, the manager of the farm known as the Pyramids Estates, and afterwards into that of Mr. F. Formby Back, the owner of the *Egyptian Gazette*, who is its principal proprietor. Under the guidance of these gentlemen I made two visits to this farm, which proved to be the same that I had passed upon my ride. What I saw there was to my mind so remarkable that I propose to give some account of it to the readers of *The Times*.

Pyramids Estates.

The property which is about ten miles from Cairo, covers 750 feddans, or, say, 800 acres of land, and lies in a long strip on the very edge of the desert. Its level is such that it can be irrigated during the Nile flood, and thus it annually receives the fertilizing deposit that is the source of Egypt's wealth. Moreover, beneath its unpromising and sandy surface—for until a few years ago it was desert such as that without the bank—are ample supplies of good water, the infiltration from the Nile. On every two acres of the land, or rather of that portion of it which is devoted to the cultivation of date palms, is a well about 30 ft. in depth, fitted with a pump and a cement tank. Also there are three artesian wells sunk at convenient spots upon the property and equipped with powerful steam machinery. From these water can be delivered at the rate of 672,000 gallons per hour into cemented channels of which a length of nearly five miles has already been constructed on the property. The proprietors, are directing their attention to a more permanent return than is furnished by annual crops—namely, to dates, the "bread cf Egypt," and the staple food of its population.

Conditions of Date Cultivation.

The date-palm can only be sucessfully cultivated under certain ascertained conditions. Thus, in the words of the Arabic saying, its feet must be in the water and its head in the sun. The roots need a constant supply of underground moisture and the crown should enjoy continual and scorching sunlight. Also it prefers a sandy soil, for which reason it does not bear so well in the clay of the Delta, or so I am informed. There is no disease which hurts the date, except that occasioned by an abnormal rainfall while the fruit is setting, an accident which has never been known to happen in this part of Egypt. Damp on its foliage is its great enemy, and therefore I belive it will not thrive in Ceylon and other places where the coconut flourishes.

Some Statistics.

Now of date-palms there are over ten millions in Upper and Lower Egypt. But practically no more are being planted, perhaps because of the capital and time required to bring them into profit. So it happens that the home-grown supply does not equal the national demand, and in the year 19,0 it was found necessary to import 5,350,000 kilos from other lands, an increase of nearly a million kilos over the amount imported in 1907. An acre of suitable land will carry from 85 to 100 trees; at the Pyramids Estates the number set is 87 per acre. These palms take ten years to come into full bearing, although a fair crop is obtainable in the sixth year. From the tenth year onwards for the remainder of their profitable life of about a century the trees should produce dates to a value of 10s. a tree. The estimate of the managers of the Pyramids Estates is that, allowing for an average crop of 15,000lb. of dates per acre, saleable at a price of three farthings per pound, the revenue from the palm trees should amount to £46 17s. 6d. per acre. To this, however, should be added a return of 1s. per tree for leaves and fibre sold. Further, the land beneath the trees which has the benefit of their shade, after these are three years old, can be readily let at an annual rental of quite £5 the acre to the fellaheen, who grow thereon grain and market-garden produce. It would seem, therefore, that when a palm grove is well established on such a farm as that which I describe it may be reckoned upon to bring in a gross revenue of over £50 the acre.

The Necessary Capital.

Now let us turn to the capital expenditure necessary to bring about this result. Such land as that of the Pyramids Estates, which until it is irrigated looks like desert, but is in reality extraordinarily fertile, can, I understand, be bought at about £40 the feddan or acre, the same price, practically as good old pasture fetches in many countries in England. Doubtless similar, but in these respects less eligible, land can be purchased more cheaply elsewhere.

The cost of the levelling of the ground by aid of a special steam-worked machine, of its equipment with wells, pumps, cemented canals (a great improvement on the old clay channels), necessary buildings, planting, &c., may, I was told, be set at £20 the acre, and all other expenses, including labour, overseeing, and so forth, until the palms come into full bearing, at another £30 the acre. This brings the total expenditure for the first ten years inclusive of the price of the estate, not allowing anything for money earned during that period from crops sold or rents received, to £90, or, let us say, to £100 the feddan or acre. This, according to my information, is quite an outside estimate, but even if it be so, a varied and extensive experience teaches me that in all agricultural operations it is wise to over-rate preliminary expenditure and to under-rate the calculated returns. Acting on this principle, let us suppose that such an 800-acre property as the Pyramids Estates, when in full bearing ten or, since it could not be all dealt with at once, 12 years after purchase represents, including an allowance for interest, a capital value of £100,000, what would be its return to the investor? It would seem that if only half of it, that is 400 acres, were planted with palm trees and the produce of the other 400 acres under various annual crops were written off or set against expenses, the net return at £50 the acre would be £20,000 a year, or 20 per cent., while the sale value of the developed property, with its great groves of palms young but in full bearing, its wells and buldings, would be enormous.

Once established, date-palms are subject to no disease, and can only be destroyed by felling, a catastrophe which is not likely to occur while England has any say in the affairs of Egypt. The same argument applies to taxation. Outside of certain small school and road rates, the land tax appears to be the only impost. This is re-assessed periodically. When ground has been brought under cultivation it amounts to 10s. the feddan, and rises to a moderate total of £1 17s. 6d. the feddan, imposed upon lands in full bearing.

The Method of Planting.

The space that remains at my disposal allows of but a brief description of the farming operations on the Pyramids Estates. The palm trees, of which about 10,000 have now been set, are grown from three-year-old suckers separated from existing trees of varieties remarkable for their excellence, shows which originated in the oasis of Siwah being, I believe, the best. To these suckers (which cost about£3 the [Pyrmids Estates] thousand) a portion of root must be attached, since otherwise they will not strike. On receipt they are planted in cuplike depressions in the sandy soil at a distance of 22ft. apart. Most of them root readily enough, though a certain proportion, say 4 per cent., fail and must be replaced. The requisites for their successful growth are protection from hot winds by means of the umbrella-like structures of maize stalks to which I have alluded, and regular watering until the Nile rises in September. After the first year only an occasional watering is required, and after the second practically none, since by this time the roots have penetrated into the damp soil beneath.

On the Pyramids Estates this watering is managed as follows:—The tank attached to each well holds sufficient water for an ascertained number of trees. The watering begins at daylight and about 11 o'clock all tanks are reported to be empty. The foreman then rides round and sees that every tree has received its share. At noon the tanks are pumped full again for the next day's use. When this task is finished the labourers do no more work until the morrow. The pay of these men is from three and a half to four piastres per diem, the foremen receiving four and a half piastres, or about one shilling, which, it will be agreed, is not an extravagant wage. Labour, however, is cheap and plentiful in Egypt.

AGRICULTURAL EDUCATION IN MADRAS.

The acting Director of the Madras Presidency says in his report on the operations of the Department of Agriculture for 1911-12 that it has been found by experience that many students of the land-owning classes who take kindly to the purely agricultural side of the present course are repelled by the scientific side, especially by the work in pure science. After a full discussion of the matter with the college staff he recently submitted proposals for revising the present diploma course by lengthening it to four years and by dividing it into a preliminary two years' agricultural course, with lectures in popular sciences but no laboratory work, and a further two years' scientific course. It would be possible to admit 40 students to the preliminary course as the numbers would not be restricted, as now, by the laboratory accommodation available. From these it should be possible to select each year 20 who would be capable of going through the further two years' scientific course successfully. It is hoped that under such a scheme both the number and the quality of qualified students would be improved and at the same time the demand for a less scientific agricultural course would be met.

THE CULTIVATION OF BANANAS.

The Banana or, as we know it here, the plantain has within recent years come to receive more careful cultivation than it did before, and is now the main subsidiary crop in the opening up of land for coconuts in the North-western Province, while being the chief cultivation in parts of the Kegalle and Dumbara districts. In the low-country the principal variety grown is the "honarawala" which has a subacid taste for which it is preferred by the Eurpeans to the "kolikuttu" or table plantain, the variety that is most appreciated locally. Up-country, the common plantain is the "suwandel" which is rarely met with in the lowlands. The fruit is characterised by mealiness and a slight fragrance to which it owes its native name. The finest of these are met with in the neighbourhood of Teldeniya. This plantain fruits at much higher elevations but does not mature properly, with the result that it scarcely possesses any fruity flavour and is indeed practically tasteless.

The Superintendent of School Gardens some years ago introduced from Queensland a number of new varieties, which included the well-known Cavendish, Lady's Finger and Sugar. The Cavendish is the one most universally grown in Queensland. It is said to be a Chinese variety of relatively small habit, and for this reason is usually closely planted, say 12 to 16 feet apart each way.

The other two varieties, Lady's Finger and Sugar, are both strong-growing and must be planted from 20 to 25 feet apart each way. So luxuriant is the growth in many cases with these strong-growing varieties that one marvels at the amount of vegetable matter produced on an acre of land, ceasing to wonder that the soil under bananas becomes rapidly exhausted of available plant food.

Except the "Sugar" the introduced varieties have not proved equal to the best local ones. Both Cavendish and Lady's Finger resemble the "anamalu" which has a somewhat rank flavour and is accordingly reckoned as one of the inferior kinds.

The variety chiefly grown in the West Indies and in Fiji is the Gros Michel. In the latter Colony it is largely used as a shade plant in young cocoa plantations, giving at the same time a regular revenue until the cocoa trees come into bearing.

In a pamphlet on the manuring of Bananas by Mr. J. M. Hattrick, the author gives the following conditions as essential to successful cultivation :—

(1) An adequate and regular rainfall.
(2) A sufficiently and consistently high temperature.
(3) Shelter from winds.
(4) Good alluvial or scrub land.

He further adds that the presence of a large proportion of humus in the soil is very advantageous, and for that reason he favours the use of organic instead of inorganic fertilizers, as, apart from adding the necessary plant food to the soil, they improve its physical condition,

We learn that there are about 44,325 acres devoted to Bananas in the West Indies (estimated in 1905): in Queensland the area does not exceed 5,000.

The following analysis furnished by Mr. Hattrick is instructive as indicating what the plant extracts from the soil :—

			(a) In plants per acre. lbs.	(b) In Bunches per acre. lbs.	(c) Total per acre. lbs.
Pure Potash	...	(K_2O)	193·6	77·88	271·48
Phosphoric Acid	...	(P_2O_5)	14·0	8·52	22·52
Lime ...	...	(CaO)	99·0	3·15	102·15
Nitrogen	...	(N)	55·8	28·74	84·54

THE BRANCHING OF RICE.

The *Bulletin of Agricultural Intelligence and of Plant-Diseases* for September, 1912, has an article on the above by Mr. N. Novelli :—

The author applies the term "branching of rice" to the phenomenon by which, under given conditions, from the lowest nodes of the principal culms already well grown (and sometimes likewise from the nodes of the secondary culms), corresponding to the points of insertion of the leaf sheaths, axillary shoots may be put out which, although later than those springing from the stock of the plant, continue to grow and finally end by forming panicles.

The varieties of rice on which the author has up to now mostly encountered this anomaly are Nero di Vialone, Ranghino, Greppi and Chinese Originario; it would seem, therefore, that the phenomenon is more common in the varieties attaining greater vegetative growth. Two years ago, at Vigevano, province of Pavia, Italy, in a low-lying rice field sown with Nero de Vialone, the author reckoned that about 10% of the plants had branched.

Although the phenomenon may not be very frequent, it nevertheless cannot, owing to its effects, be otherwise than injurious to production. The axillary shoots in point of fact never bring their ears to maturity, and act as real suckers on the principal culms, depriving the latter of their nutriment, inhibiting their development and retarding the ripening of the principal panicles, which are thus left with less vigour and poor in well-formed grains.

Observation and investigation covering several years have led the author to include among the presumable causes of the phenomenon the irregular function of assimilation on the part of the plant, an enfeeblement of vegetative development due to mechanical causes and excessive height of water in the rice field during sprouting.

To prevent branching of rice the author recommends: (a) that no very late manuring, especially nitrogenous, should be carried out (on soils on which conversion is deemed to take place slowly it is necessary to advance the time of manuring); (b) not to carry out late weeding or rolling; (c) not to keep the water too high in the rice field during sprouting.

COST OF CARTING MANURE.

The *Bulletin of Agricultural Intelligence and of Plant-Diseases* for September, 1912, has a very interesting account on the law of the decrease of returns with the increase of the distance of the fields from the farm from which we take the following extracts :—

This study is based on the account books of eight large farms entered at the "Association for Book-keeping on the Howard system." They refer to the agricultural year 1909-1910. The chief material is supplied by auxiliary books in which for each field of the farm and for each crop account has been kept of the amount of time expended upon it both by men and draught animals. These data were again sub-divided.

In calculating the time employed the following speed in travelling without a load was assumed :—

Horses	1·05 metres	(3·43 ft.)	per sec.
Oxen	0·71 ,,	(2·13 ,,)	,,
Men	1·00 ,,	(3·28 ,,)	,,

From the examination of figures of the various crops it appears that in practice the influence of distance, if it has not been completely eliminated, has been sensibly reduced. This is due to the sense and personal ability of the farm manager.

The following are some of the facts that appear evident from these investigations.

That the growing of rye in the most distant fields has lent itself very well among cereals to resolve the problem of distance; it gives a fair profit even in relatively distant fields. Among forage crops lucerne and clover answer well.

The practice of fallowing has also in certain cases proved useful, especially for heavy lands which for their distance could not have been profitably dressed with stable manure.

Green manuring also contributes to reduce the effect of distance and in the most distant fields it can almost replace fallowing.

With a view to demonstrating that the connection between the value of the land and the distance from the farm is recognised in practice, the following table gives the figures actually paid by a farm for some fields :—

Area Acres.	Years in which the purchase was made.	Distance of the field from the farm. Yards.	Purchase price per acre. £ s.
27·28	1906	3,179	—
6·82	1906	3,582	65·14
5·58	1906	2,516	—
3·70	1907	3,118	86·18
8·41	1910	3,008	86·18
5·25	1910	3,118	86·18
24·70	1909	4,595	71· 2
8·65	1908	5,716	53· 4

Cost of Carting Manure according to Distance of Fields from Farm Buildings.

Distance of fields from farms. Yards.		No. 1. Total cost.	No. 1. Cost for journey only.	No. 8. Total cost.	No. 8. Cost for journey only.	Remarks.
		s. d.	s. d.	s. d.	s. d.	
0·505	per ton ...	— —	— —	1 2½	— 2	Cart of 24 cwt.
	per cart ...	— —	— —	1 6	— 2¼	
505·1009	per ton ...	1 6	— 3¼	1 1¼	— 2¾	
	per cart ...	2 2½	— 5	1 4¼	— 3¼	
1009-1640	per ton ...	1 7¼	— 6¼	1 3⅕	— 6⅕	
	per cart ...	2 5	— 3¾	1 6¾	— 7¾	
1640·2187	per ton ...	2 1½	— 8¼	1 4	— 9¼	
	per cart ...	3 2¼	1 0	1 7¾	— 11¼	
2187·2734	per ton ...	2 0¼	— 10¾	1 7¾	— 11¼	
	per cart ...	2 11¾	1 3¾	2 0¼	1 1¾	
				Outlying	buildings	
2734·3281	per ton ...	2 8¼	1 0	1 3¾	— 11¼	
	per cart ...	3 11¼	1 5½	1 7½	1 1¾	
		Outlying	buildings	Outlying	buildings	
3281·3828	per ton ...	2 4¼	— 9¾	1 4½	— 9	
	per cart ...	3 5¾	1 2½	1 8	— 11¼	
3828·4374	per ton ...	2 2¼	— 7¾	3 1¾	1 1¼	Bullock carts.
	per cart ...	3 2½	— 11½	3 10¼	1 4½	
		Outlying	buildings	Outlying	buildings	
4374·4921	per ton ...	1 9½	... 9	1 5½	1 6	Bullock carts.
	per cart ...	2 10¾	1 1½	1 9¼	1 10	

This will facilitate also the resolution of the problem of establishing outlying buildings for the most distant fields, taking into account the greater value which they would thereby acquire.

Lastly it is to be noted that the planting of orchards has often proved a profitable way of dealing with the distant fields, whilst in extreme cases forest trees have been used.

MANGIFERA VERTICILLATA.

Through exchange with Mr. P. J. Wester, Horticulturist to the Bureau of Agriculture, Philippines, Mr. C. Drieberg, Secretary of the Ceylon Agricultural Society, received on October 2nd last 3 seeds of a new fruit which is referred to as follows in a letter from Mr. Wester:—

"Under separate cover I take pleasure in sending you a few seeds of the "Bayono" (*Mangifera verticillata*). This is a fruit which has just come to the notice of the Bureau and is indigenous to Mindanao. It is considerably larger than the mango, pyriform, yellowish-green, smooth; the flesh is white and partakes of the flavour of the peach, apricot, and soursop, and promises to become a valuable addition to our tropical fruits. The tree seems to prefer a low situation and seems to succeed well even in regions subjected to annual floods."

Two of the three seeds planted on the 2nd October germinated in about three weeks and have now (November 4th) reached a height of 6 inches. It is proposed to plant them in the Heneratgoda Gardens.

HEVEA SEED.

When Collins wrote his "Report on the Caoutchouc of Commerce" in 1872, he suggested that Hevea seeds should be sent packed in sugar to ensure their germination on arrival. Whether that method was ever adopted has not been recorded. Apparently it was not. The first consignment of Hevea seed received at Kew was sent in a barrel, and out of 2,000 seeds only 12 germinated.

The first demonstration that Hevea seed could be sent safely through the post, if properly packed, was given by Trimen, who in 1894 recorded that 200 had been sent from Ceylon to Kew in that year, every one of which germinated after being one month in transit. For some years after that, both Ceylon and Singapore favoured Wardian cases of plants, instead of seed, for transmission abroad; but the practice has now settled down to packing in charcoal and forwarding by parcels post, the chief essentials being that the seed should be packed fresh, and in small quantities, not more than about 500 in a tin.

During the last few years, several instances have been recorded in which the germinative capacity of the seed has been retained for a period which ten years ago would have been thought incredible. The late J. K. Nock, in the Report of the Royal Botanic Gardens, Peradeniya, for 1908, stated that on August 25th, 1500 seeds, packed in charcoal and coir dust, slightly damped, in biscuit tins, were forwarded to India, but as the consignee could not be found they were returned to Ceylon on November 4th, seventy-two days after despatch. They were immediately sown in an open bed, and 496 plants were raised, the last seed germinating on December 20th, or 144 days after gathering; this number would probably have been exceeded had not the bed been visited by porcupines a week or two after germination had commenced. These seeds therefore gave a germination of 33 per cent. after being packed for 72 days.

Spring, of the Federated Malay States, has recently recorded a similar occurrence of longer duration. 600 seeds were packed in layers of burnt rice husk, in a box 12 × 8 × 5 inches, which was wrapped up in canvas ready for despatch on January 31st; but as the customer had forgotten to leave his address they could not be forwarded. On July 13th, 5 months and 13 days afterwards, the tin was opened and left near a window, and 53 seeds germinated. 100 others were then sown in a pan, and three more plants were produced. As the lower layers would not be likely to have much chance of successful germination, the probable percentage germination is much higher than the figures indicate.

Another instance of prolonged vitality has just been noted at Peradeniya. On September 25th, 1911, 300 seeds were packed in layers of charcoal and coir dust in a tin which was wrapped in canvas in the usual way. On August 17th, 1912, the tin was opened and the seeds sown in pans, with the result that 117 germinated and produced plants by September 25th, 1912. The seeds were planted too thickly in the pans, and with less opportunity of contact with decaying seeds a few more might have germinated. However, as it stands, 39 per cent. germinated after being packed for nearly eleven months.

Experiments to test the relative vitality of seed from tapped and untapped trees were carried out at Peradeniya in 1907. A sample of seeds from a consignment just about to be exported was sent in for report, and the subsequent experiments with Peradeniya seed were undertaken primarily to determine whether the weight of the seed gave any criterion as to its germinative capacity. Consequently, the seeds were kept under conditions which approximated to ordinary estate practice. As stated in the Circular on the subject, they were kept in open dishes in the laboratory: they were not packed in charcoal or preserved in any way. The results showed that the seed from the tapped trees retained their vitality longer than the seed from the untapped trees. Similar experiments have been carried out by Spring, but with the seeds packed in charcoal, as for export, in tins each containing 200 seeds. Under these conditions, the seed from untapped trees showed a greater percentage germination during the period of the experiment (10 weeks) than the seed from the tapped trees. Seeing that the conditions were altogether different, a different result is not so surprising. It would be interesting to have a repetition of the two experiments on the same samples of seed to ascertain whether the difference is really due to the manner in which the seeds were kept. Unfortunately, Spring made no preliminary test of the germinative capacity of his seeds; and his figures would seem to show that his seed from tapped trees was originally of bad quality. The percentage germination after being packed 3 weeks was only 33. Considering that the bulk of the Hevea seed sold is from tapped trees, it would seem evident that the usual percentage germination is greater than that.

Information with regard to the weight of Hevea seed is gradually approximating to uniformity, and it is becoming more and more evident that the discrepancies between previous accounts were due in some cases to errors of experiments and in others to abnormal samples. Carruthers weighed a small number of seeds at Peradeniya, and subsequently published his results in the *Agricultural Bulletin of the Straits*, etc; he found that 414,000 seeds would be required to yield a ton of kernels, but the seeds were weighed fresh and no allowance made for drying.

Experiments in Ceylon in 1907 showed that, in round numbers, 700,000 seeds would be required to furnish a ton of kernels; but actual trials on estates have proved that with unsorted seed from regularly tapped trees the number is about a million. In the F. M. S., Lewton Brain has recently made experiments which lead him to deduce that the number required will be about 533,000. The weight of 1,000 fresh seeds was 8 lbs. 6 ounces, the weight of the shells alone being 3 lb 2 oz; this gives a total of 426,700 seeds required to produce a ton of fresh kernels, and allowing 20 per cent. for loss on drying brings the number required to 533,000.

In the Ceylon determination, the weight of 1,000 fresh seed was assumed to be 8 lbs. As the F. M. S. determination was based on seeds weighing 8 lb. 6 oz. per thousand, that would account for a difference of about 10 per cent. in the estimates. But another difference arises from the fact that Lewton-Brain assumes that the loss of weight on drying is 20 per cent. of the kernel, whereas the Ceylon figures show that it is 20 per cent. of the whole seed, and the shell loses very little.

The weight of a single Hevea seed, of course, varies enormously, but over a series of large samples the average weight works out fairly

constant, and the figures now available show that there is not that difference between the Hevea seed of different countries which was once supposed to exist. At Peradeniya, fresh seeds weigh on the average about 3·75 grams: but one tree has this year produced seed which averages 7·1 grams. Further, a tree on a neighbouring estate, planted in tea, has borne seed which averages only 2·75 grams; and the smallest weight recorded for an individual seed (fresh), in Ceylon, is 1·2 grams. Vernet, in 1908, recorded that Hevea seed in Annam varied from 1·02 to 9·55 grams each, and he somewhat astonished other countries by stating that seeds weighing less than 5 grams each should not be used for planting; but he has since withdrawn that recommendation because he found it impossible to obtain any large number of seeds of the desired weight.

It is sometimes stated that in Ceylon two crops of seed are obtained in the course of the year. In a certain sense, that is correct, but the deduction frequently made by writers in other countries, that the same trees fruit twice in the year, is not. On the Western side of the island where rain falls normally during both monsoons, the trees flower in February-March, and bear seed in July-September. But on the Eastern side, where rain falls only during the North-East Monsoon, October-January, the trees fruit in December-February. The fruiting period of Hevea, and practically all fruit trees, *e.g.*, mango, differs by six months on the two sides of the Island. But each tree only bears fruit once. An interesting case was observed this year on an estate which, though subject only to the North-East rains, lies at the foot of the range of hills which divides the two regions. In March last, seed was falling from the trees on the slopes, *i.e.*, their phase was the normal one for that side of the Island. But in one field, where a small stream ran at the foot of the slope, the trees on the slope were seeding while those along the stream were shedding their leaves, *i. e.*, the latter were in the same physiological condition as the trees on the western side of the Island. There was thus six months difference between trees not more than a hundred yards apart. Similar phenomena have been recorded for Singapore, where, apparently, some trees may be found in fruit at any time of the year. Whether any tree fruits twice in the course of the year at Singapore has not been recorded, nor have the differences between the various trees been correlated with their environment.

T. P.

CHEAP SEED.

The following table by Mr. W. Borlase printed in the *Journal of the Board of Agriculture* for October, 1912, will be read with interest:—

		s. d.			Percentage of germination.
Perennial Red Clover	at	1 0	per lb.	...	97·1
do do	,,	0 10	,,	...	78·6
do do	,,	0 9	,,	...	60·3
Alsike Clover	,,	1 0	,,	...	98·1
do do	,,	0 10½	,,	...	53·1
White Clover	,,	1 1	,,	...	98·5
do do	,,	0 11½	,,	...	82·8

ERI SILK.

The *Bulletin of Agriculltural Intelligence and of Plant Diseases* for September, 1912, has a very interesting account on the above subject from which we take the following extracts :—The eri silk is a silk grown in Assam and the cloth woven from it is known as "Endi" cloth. The difference between this and other silk is that it cannot be reeled and the cocoon is not formed of a long continuous thread but is spun by the worm in layers. Eri silk will probably be extended to other parts of India for cultivation on a small scale.

Rearing.

Eggs are obtained and kept in a tray-like vessel to which air is admitted. In hot weather the trays should be covered with a damp cloth and in very cold weather similarly covered and kept in the sun. In hot weather the eggs hatch in 7 days and in cold they may stay as long as 24 days. When the worms are hatched they are transferred to feeding trays, with a free circulation of air, they are kept covered during the day and during very cold weather kept in the sun just as the eggs. The management of rearing is the same as that recommended for the common silk worm, with the exception of food which is the leaf of the castor plant.

Spinning.

The "Chandraki" Spinning Frame of Bengal used for mulberry silk is successfully used but it takes up too much space. Another method is to suspend cloth over horizontal bamboos so that long folds hang down and to let the worms crawl into the folds to spin. Very clean cocoons can be got this way and they are readily detached from the cloth: the amount of silk wasted in cocoon formation is small. After 5 days in hot weather and 8 in cold the cocoons are picked out and spread evenly on trays. After 10 days in summer, or up to 40 days or more in winter, moths come out. They are then placed in a covered basket; after 24 hours the males may be thrown away and the females placed in a separate basket in which they will lay eggs. Each female lays about 80 eggs the first night. Eggs laid after the third night should not be kept. The empty cocoons are boiled in water in which a weight of castor ash equal to the weight of silk is dissolved, until the cocoons are soft throughout.

The cocoons can be carded and spun like wool, or the silk may be spun directly from the cocoons which yield $\frac{5}{8}$ to $\frac{3}{4}$ of their weight of thread.

Duration of Life.

The whole life cycle from the laying of the eggs to the flight of the moths varies from 37 to 85 days according to the weather but in the winter the duration of a brood may extend up to 100 days and over.

The Eri worms are polyvoltine and rearing goes on all the year round. The worms spin two kinds of cocoons—white and red-brown. A moth lays eggs from which both white and brown cocoons are formed, but if only the moths from white cocoons are bred the red cocoons will gradually disappear and *vice versa.* White cocoons are preferred.

THE COST OF AGRICULTURAL IMPROVEMENTS IN EGYPT.

The following is a list of the works and of the accounts published in the *Bulletin of Agricultural Intelligence and of Plant Diseases* for September, 1912, which may be comprised in Egypt under the heading of agricultural improvements. The figures given are per acre :—

1. Division of the land into lots and setting out the chief roads or scetions of the estates as a preliminary to the programme of further work : 20 to 30s. per acre.

2. Breaking up uncultivated land by means of steam or ox ploughs after cutting down shrubs and burning the bush : £1. 10s. to £2 and sometimes, though rarely, even £4.

3. Levelling the surface with the levelling machine worked by steam or by oxen or by means of Decauville waggons drawn by mules or pushed by men, the work being finished sometimes by flooding the land and dragging heavy planks drawn by strong teams over the submerged soil. The cost of this work is very variable, from £3 to £4 and sometimes £8 to £9 12s. Very undulating sand surfaces and the filling up of very low-lying lots may cost as much as £14. 10s. to £19. 5s., and in some rare instances £24 or £30 per acre.

4. Cutting of canals, consisting in the excavation proper done with spades, hoes, by hand or with baskets. Under this head syphons, culverts, small bridges etc., are included. These canals often complete the work of parcelling the land in lots. The cutting of irrigation canals costs generally 20 to 30s. per acre, everything included. Drainage canals are often omitted when the ground does not require them and is not liable to infiltrations. According to the level and degree of salt content of the ground the cost of canals varies between £1 and £2. 10s. per acre.

5. Irrigation or drainage pumping stations, which may be either simple water wheels driven by oxen and costing from £24 to £32, or more expensive plant up to the powerful machines worth £3000 to £4000, with all intermediate classes ; the cost is generally about 17s to 38s per acre.

6. Removal of salt : this consists in freeing the soil from salts, principally sodium chloride, by a system of washing and under-draining. Warping does not remove anything and consists principally in bringing Nile mud on to the land ; in this case surface-drainage is used. Washing-out salt can generally only take place from late autumn to the middle of spring. It costs about 8s. to 10s. per acre for the season, not reckoning the use of any pumping apparatus required. Warping is carried out in flood-time and costs rather less.

7. Improvement by crops : this is intended either to continue the work of salt-removal (rice), or to enrich the land (clover). Certain alkali-land can only be improved by a further treatment of applications of gypsum or soil. After vigorous washing-out of salt the improving crops may give a yield equal to their cost, but the first crop frequently shows a deficit of some 20s. This deficit, to some extent reduced however, may be repeated for each subsequent crop till the land is in good condition. Improvements by gypsum or earth may cost respectively 20 to 30s or £6 to £10 according to the amounts applied.

8. Buildings and purchase of livestock and implements: houses, barns, sheds, oxen, mules, riding-animals, Decauville rail-road, ploughs, levellers, etc. The most appropriate system of settling requires in Egypt one labourer's cottage for every 100 to 125 acres under crops. There are some comparatively dry districts in which buildings of sun-baked clay will do, but in the Lower Delta burnt bricks have generally to be used. For this reason the cost per acre may be as low as 20s (including houses for the hands, barns, etc.,) or may reach £2 to £4. The laying-down of lines for the Decauville trucks costs 5s. to 20s. according to the metals and trucks used. The rest of the stock, live and dead, does not generally come to more than £1 per acre under the plough, that is being cropped or only undergoing improvement.

9. Upkeep, working, repairs, and sometimes repetition, for certain classes of work specified. Expenses of upkeep are required specially for the water-channels, which need yearly or two-yearly attention, coming to 2s. or 3s. per acre. Expenses of working are entailed by the pumps in use on the land under improvement. In general, and excepting rice which requires frequent waterings, the expenses do not exceed 4 to 6s. per acre per annum for each operation of irrigation or artificial drainage. When any land which has been improved is allowed to fall back again owing to bad cultivation, it must be again treated by means of improving crops etc.; such repetition costs £1 to £3.

10. Amortisement, general expenses, taxes and interest before the land comes into full bearing. The charge for amortisement and interest on the plots put out of cultivation for improvement, and which may be worth £20 to £30, is 30 to 40s. per annum; for land costing, or worth, as much as £50 to £50, and not giving any returns the charge will be 50 to 60s. Land under improvement has to bear expenses of management estimated at 6 to 10s. per acre. The taxes on this land are generally between 2 and 5s., or more for certain plots surrounded by "hods" in bearing.

The work of improvement lasts a variable number of seasons; in the best conditions two whole years, but it may be even 5 or 7 years before the land can be properly cropped without fear of a rapid falling-off of condition. The whole series of operations enumerated average £20 to £25 per acre in favourable cases; but it may make away with £40 to £50 where the improvement is difficult and the fertility low.

CROP AREAS.

The following are the acreages under the various crops in the Nyasaland Protectorate:—

Acres under cultivation, 1911.	Acres under cultivation, 1912.	Estimated crop 1912 unginned.
	NYASALAND UPLAND COTTON.	
21,502	23,300	2,809 tons
	EGYPTIAN COTTON.	
1,830	755	74
	TOBACCO.	
4,507	7,411	1,514¼ tons
	SISAL HEMP.	
172	75	—
	CEARA RUBBER.	
7,542	9,014	8,934 lbs.

COTTON PLANTING IN EGYPT.

Cotton is planted in all varieties of soil in Egypt and may occur upon the same pieces of land twice in a period of three years, although good cultivators do not plant it more frequently than once within that time. It usually follows clover, beans or a bare fallow, and occupies the ground from February to March until October to November in Upper Egypt and from March or April or even May until November or December in Lower Egypt. During the early months of the plants' growth, the neighbouring fields are chiefly under crops of clover (*bersim*), wheat, barley and rice, and during the months after the advent of the Nile flood water, maize, millet and clover. For a cotton crop the ground is ploughed in two or three directions and then formed into ridges from 60 to 90 centimetre apart [say 2-3 feet] and running from east to west in order to permit the seed to be sown upon the southern face so as to receive as much sun as possible during the early months' growth and be protected from the cold winds from the north. Watering is done entirely by irrigation channels from canals or by means of pumps upon the river. In the first case it may be by free flow, high level canals, or by means of lifting it from low level ones. It is usual to water cotton about thirty days after sowing and then at intervals of from sixteen to twenty days until the flood arrives in July, when it is frequently the practice to run on an excess of water, often to the extent of leaving the plants standing in the water for a considerable time.

Flowering commences in July and the first ripe bolls appear in September. Although cotton worms and boll worms exist on other plants early in the year, the first do not appear in large quantities upon the cotton plants until the beginning of July and boll worms are usually rare upon the plants until August.—*Cottonworm and Bollworm Commission of Egypt, 1912,—Circular No. 1*,

LAC CULTIVATION IN CEYLON.

Two boxes containing 100 sticks of Ber or Masan (*Zizyphus jujuba*) were received on the 10th of October having been despatched from Pusa on September 28th. Owing to the delay in transit, about 50% of the larvæ had emerged from the sticks.

A few branches of the masan tree at the Royal Botanic Gardens were inoculated with the larvæ on the 11th and some sticks were given to Mr. A. Lee Simpson of Mandalagirikande Estate, Wattegama, and to Mr. K. Bandara-Beddewela of Mahgatenne, Kandy, who are interested in the cultivation of lac. Of the balance, two masan trees were inoculated at Tangalle and two at Ambalantota in the Hambantota District as the climate of this part of the country is considered by Mr. Bainbridge Fletcher, (who was recently Acting Imperial Entomologist of India), who has been in Ceylon and knows the local conditions to be more suitable for lac.

The success of the inoculation at Ambalantota is doubtful, as the brood lac was 15 days old when used for inoculation and the larvæ had nearly all emerged from the sticks. The larvæ have settled down in branches of the masan tree at Peradeniya as well as in the two at Tangalle.

The delay in receipt of the boxes, which took twice as long in arriving as they should have done, has been reported to the Imperial Entomologist for India; who has also been asked to be so good as to arrange to send brood lac suitable for the Kon (*Schleichera trijuga*) and Rain tree.—(N. WICKREMARATNE, Agricultural Instructor.)

COFFEA ROBUSTA.

A study of *Coffea Robusta*, by M. Kramer, Director of Agriculture at Buitenzorg (Java) is reprinted from the "Revue Agricole" in the *Queensland Agricultural Journal* for September, 1912:—

Precocity,—In Java the Robusta yields a first crop at two years of age. In the third year the yield is 15¾ oz. and from the fith year onwards over 2 lbs. per tree.

Harvest.—This continues in Java throughout the year as the berries do not ripen at the same time but during consecutive months; and this is an advantage as it permits of a more economical utilisation of the permanent labour force and does away with casual labour at picking time, which labour is difficult to obtain and very burdensome.

Yietd.—About 13 lbs. of cherry Robusta yield 2 lb of beans, a greater yield than that of *Coffea Arabica.*

Value.—We have frequently published in the "Revue Agricole' figures which show that at Havre the *Coffea Robusta* sells at about the same price as our Caledonian coffee (present current price, 2s. 1d. to 2s. 8d. per lb), that is about £118 per ton.

Resistance to Hemeleia.—It has been asserted that *Coffea Robusta* has shown spots of hemeleia. This is certainly not impossible. In Java this variety is not absolutely immune, but it resists the disease; the leaves do not fall off and the tree continues to flourish and fruit.

Cultivation.—The Robusta must be planted under shade and allowed more room than the Arabica. In Java the trees are planted 10 feet apart each way. When the plant has attained its fourth or fifth year the shade may be removed. The trees are topped at about 6 feet.

Special Precautions.—A good plan is to treat the nursery plants with preparations of sulphate of copper or flowers of sulphur.

THE FEEDING OF COCONUT CAKE TO MILCH COWS.

The following remarks culled from the "Journal of the South-Eastern Agricultural College, Wye," appear in the *Journat of the Board of Agriculture* for October, 1912.—An investigation was carried out on the College Farm during the months of April and May, 1911, to determine the suitability of coconut cake as a food for the production of milk and butter. Three cows, which had calved about two months previously, were selected, and, after being fed for a fortnight on an ordinary ration, were given a diet containing coconut cake, the quantity fed being at first 2 lb. a day, and gradually increased to 6 lb. per head daily. The total period in which the coconut cake was fed was three weeks, after which the cows were kept under observation for a week, during which time they received ordinary foods. The coconut cake appeared to produce very little effect on the yield and quality of the milk, and on the Reichert number of the butter, though in view of the shortness of the period and the small number of cows it is impossible to draw definite conclusions. It was clear, however, that the cake made the butter much firmer, and it is suggested that on this account it should prove useful as a food in warm weather when difficulty is experienced in making firm butter.

SECRETARIES OF THE ALL-CEYLON EXHIBITION 1912.

C. Drieberg, B.A., F.H.A.S.

E. B. Denham, B.A., C.C.S.

H. F. Macmillan, F.L.S., F.R.H.S.

View of Main Pavilion.

View of Main Pavilion.

THE ALL-CEYLON EXHIBITION, 1912.

Low-Country Products.

The Section devoted to Low-country Products as distinct from the Estate Products or Up-country planting products (Rubber, Tea, Cocoa, &c.) included as its main sub-section exhibits representing the coconut industry, viz., coconuts in and out of the husk (judged for size and thickness of kernel or meat), largest bunch, king coconuts (chiefly used for drinking), collection of varieties, copra (sundried and kiln dried), poonac or coconut cake turned out by the *chekku* or native bullock-mill and made by machinery), coconut oil (ordinary and white), yarn and rope, fibre (bristle and mattress), dessicated coconut of various grades (representing an industry by itself), arrack or coconut spirits, and a general collection of the product of the coconut palm.

The Exhibits under all these heads were numerous and of good quality so that competition was keen, and the liveliest interest evinced in the decision of the judges.

In fact the demand on the available space was so great that the less perishable exhibits, consisting of unhusked nuts, had to be accommodated in the open—particularly the collections of different varieties (of which one exhibitor sent not less than 32) and the bunches.

In addition to the exhibits in the main pavilion, the Low-country Products Association justified its designation by an interesting collection housed in its own pavilion, which was well patronised by visitors. The success of this excellent representation must be credited to the energetic Secretary of the Association, Mr. H. L. de Mel, who was kept very busy answering questions and furnishing information.

Mention should also be made of two "coconut-houses" erected by Mudaliyar A. E. Rajapakse and Mr. Hector W. F. Dias, both of which were very attractive trophies. These miniature pavilions were entirely constructed of materials derived from the coconut palm, and their contents illustrated the multifarious uses to which the different parts of the palm could be put.

Coconut Products.

The awards for low-country products were particularly liberal and consisted of no less than 6 cups, 3 gold medals and 25 silver medals. The cups and gold medals for the coconut exhibits were distributed as follows:—

A.—*Cups.*

1. Best all round sample of 12 nuts (husked):
   Don Pedrick Gunatillaka, P. V., Bandaragama.
2. Collection of coconuts of different varieties, 1 bunch of each.
   Mr. W. H. Dassanaike, Kanatte Road, Colombo.
3. Collection of products of the coconut palm:
   Mudaliyar A. E. Rajapakse, Katunayake.

B.—*Gold Medals.*

1. Best commercial sample of Copra;
   Mr. R. E. S. de Soysa, Alfred House, Colombo.
2. Dessicated Coconuts, 3 grades, one lb. of each;
   Mr. H. A. Peiris, Barnes Place, Colombo.

3. Commercial Coconut Oil (1 gallon).
The Hon. Mr. A. J. R. de Soysa, Colombo.

Cinnamon.

The competition for the cinnamon prize at shows has always been very keen, not because the cinnamon industry is at present in a very thriving condition but because it has been represented from the time of the British occupation (when it was one of the most paying products) by a few important families who have always been rivals in the trade.

The catalogue called for 5 lb. samples of the following grades:—five grades of fine, four grades of ordinary and chips. This will give some idea of the care with which cinnamon is manufactured or rather prepared for the market, involving very careful selection and treatment of the bark, for the preparation of the finer qualities. The first prize consisting of a cup went to Mudaliyar A. E. Rajapakse of Kadirana Estate, Katunayake, in the Negombo district, which is one of the oldest and best-known cinnamon districts of the Island and include some of the most notable estates such as Goluapokuna, Wester Seaton, Kadirana and Ekella, associated with the names of Nicholas, Schrader, Piachaud, Rajapakse, Jardine, Drieberg and De Mel.

One other item which elicited considerable competition was the general collection of the products from a low-country estate (below 1,650 ft). This gave great scope to exhibitors and the collections sent in were as full as they were interesting. The cup offered for this collection went to Mr. R. S. Peiries, The Alcove, Colombo.

PRODUCTION AND CONSUMPTION OF RUBBER.

We take the two following tables from the *India Rubber World* for October, 1912. It will be seen that the rate of consumption has increased from 88,000 tons in 1911 to 99,564 for 1911-12. From *Table A* it is seen that the Uinted States takes nearly one-half of the world's production of rubber; but London is the principal rubber market of the world.

Table A. PRODUCTION AND CONSUMPTION FOR 1911.
(S. Figgis & Co. London.)

Actual production in 1911.	Tons.	Actual consumption in 1911.	Tons.
Brazil	39,000	America and Canada ...	42,000
W. Africa	15,000	England	12,000
E. Africa, Penang Borneo and Rangoon ...	5,500	France	8,000
Assam, and Madagascar America and Mexico ...	2,500	Russia	8,500
Guayule	9,200	Italy	2,000
Plantation	14,000	Japan and Australia ...	1,500
Malaysian and extracted for Jelutong ...	2,800	Germany and Australia ...	14,000
Total ...	88,000	Total ...	88,000

Table B. HECHT'S WORLD'S FIGURES, 1911-12.

	Para Grades Tons.	Medium Grades Tons.	Total.
Arrivals (production) ...	40,953 ...	54,309 ...	95,262
Deliveries (consumption) ...	44,194 ...	55,370 ...	99,564

A NEW RUBBER-PRODUCING PLANT.

The following are a few particulars by the Chief of the Botanic Section of the "Secretaria del Formento" in Mexico, printed in the *Bulletin of Agricultural Intelligence and of Plant-Diseases* for September, 1912, regarding a new rubber plant. This tree, unlike others, grows in hilly country in dry and stony soils. It is called by the natives "Cacalo-xochitl" and belongs to the genus *Plumeria* of the family *Apocynaceæ*. All the known species of this family in Madagascar produce a latex-like juice; but *Plumeria rubra* is the only one known up to now as a producer of rubber in sufficient quantity to be worth extracting.*

The trunk, from 6½-16 feet high, has a girth of from 8 to 24 inches; the bark is rough and of a light gray colour; the leaves are opposite; the flowers are white and large and the root is used by the natives as a purgative. *Plumeria* is common in many regions of Mexico and Central America, it grows under the best conditions in sandy, stony and rocky soils on the mountains at a height of 1,000 to 4,000 feet, in dry regions where there is an average yearly rainfall between 30 and 50 inches.

The following composition was found on analysing the coagulate of the latex :—

Resin	...	...	21·9 %
Moisture	...	...	15·7 %
Rubber	...	...	25·5 %

This tree is easily reproduced by slips, and in the Botanical Station of Tezonapa, four weeks after a branch had been planted, new leaflets were observed. This plant is capable of producing a good quality of rubber. Investigations are being made and from the experiments carried out at the Botanical Station of Tezonapa indications are already available as to the best method of tapping. The ordinary system of incision would not give good results. The young parts of the plant contain a quantity of rubber in excess of that of the trunk. Lopping off the heads of the plant is advisable and extraction must be made from branches thus pruned; this pruning improves the condition of the tree and increases the growth of the branches.

JUTE CROP OF BENGAL FOR 1912.

The Director of Agriculture, Bengal, reports on 21st September, 1912, that the final figures for acreage show an increase in Bengal of 202,250 acres. Bihar returns an increase of 40,222 acres, and Assam an increase of 4,922. The grand total of increase for the three provinces is, 247,394 acres and the percentage of increase 7·9 per cent.

OUTTURN.

The final total outturn for Bengal only works out to 8,502,135 bales. Bihar returns an increase of 87,412 bales and Assam a decrease of 12,930 bales.

* *Landolphia Kirkii* and other Landolphias, the sources of the principal African rubber, as well as *Funtumia elastica* the Uganda and West Coast rubber, and *Mascarenhasia elastica* the "Goa" rubber of the East African Coast all belong to the natural order Apocynaceæ. Neither *Plumeria rubra* nor *Plumeria alba* have in Ceylon been found to yield rubber in paying quantities.—EDITOR *T.A.*

MILK YIELDS.

The following tables are from the *Report of the Director of Agriculture, Jamaica*, for the year ended 31st March, 1912:—

IMPORTED COWS, 1911.

Order.	Breed.	Age.	Lbs. Milk.	Average yield Qts.	Max. yield Qts.	Days in Milk.	Value of Milk. £	s.	d.
1	Guernsey ...	7	6,937	8·8	12·2	302	51	16	11
2	,, ...	6	5,470	6·9	10·2	305	43	17	0
3	Holstein ...	12	5,057	7·9	9·0	284	40	10	8
4	Ayrshire ...	7	5,044	6·6	9·7	294	40	8	8
5	Jersey-Guernsey.	8	4,740	5·4	8·4	340	37	19	9
6	Guernsey-Canadian.	8	4,459	4·9	8·3	348	35	15	5
7	Guernsey-Ayrshire.	8	4,425	6·3	9·8	271	35	9	4
8	Guernsey ...	10	3,471	4·5	8 0	300	27	16	2
9	,,	11	2,458	2·8	4·5	340	19	17	1

NATIVE COWS, 1911.

Order.	Breed.	Age.	Lbs. Milk.	Average yield Qts.	Max. yield Qts.	Days in Milk.	£	s.	d.
1	¼ Indian ...	8	5,047	7·4	11·5	269	40	19	11
2	½ Jersey ...	7	4,095	5·3	7·9	300	32	15	3
3	Unknown ..	8	3,957	5·3	8·5	287	31	14	4
4	½ Angus ...	8	3,946	5·3	9·0	289	31	13	2
5	½ Jersey ...	6	3,640	4·7	7·1	296	29	3	6
6	½ Holstein .	8	2 615	4 0	5·3	253	21	0	2
7	½ Jersey ...	8	2,538	3 6	5·5	269	19	16	3
8	½ Shorthorn	7	2,187	4·0	7·1	210	17	10	6
9	½ ,, ...	8	2,093	4·1	6·6	196	16	16	5
10	Barbadian .	6	1,908	3·3	10·7	219	15	5	10
11	½ Devon ...	8	1,795	3·1	4·2	221	14	9	9
12	½ Shorthorn	7	1,750	3·2	5·0	205	13	12	0
13	Unknown ..	7	1,490	4·0	6·2	144	11	18	10

CROPS OF BENGAL.

The following are the acreages under the various crops as reported by the Director of Agriculture, Bengal:—

COTTON CROPS OF BENGAL 1912-13.

The total area sown with the early crop is reported to be 49,250 acres against 60,900 acres last year, the decrease being due to scarcity in Hill Tippera and the Chittagong Hill Tracts.

The area sown with late cotton up to date is reported to be 500 acres only as compared with 1,800 acres last year.

SESAMUM, 1912.

The total area sown up to date is reported to be 21,200 acres. Sowings are still reported to be going on in parts of Hooghly, Murshidabad and Nadia. Last year the area under the crop was estimated at 22,500 acres.

MONSOON RICE. 1912.

The area sown this year with different monsoon rice is reported to be 6,153,500 acres against 6,294,100 acres last year, the normal area being 6,732.200 acres. Of these 5,002,800 acres are alone reported to be under autumn *(aus)* rice this year against 5,092.200 acres last year, the decrease being reported to have been chiefly due to extension of jute cultivation.

PRODUCTION OF SULPHATE OF AMMONIA.

In dealing with this subject the *Journal of the Board of Agriculture* for October, 1912, says:— The report of the Chief Inspector of Alkali Works for 1911 (H. C. 197, 1912) shows that there were 570 works or separate processes for the manufacture of sulphate and muriate of ammonia in England and Wales, as compared with 543 in 1910 and 536 in 1909, the number having steadily increased from 440 in 1904. In Scotland the number of such works was 106. There were also 56 gas liquor works in England and five in Scotland.

Ammoniacal Results.

Sulphate of ammonia is chiefly obtained as a bye-product from coal. When this is treated for the production of coal-gas or for the manufacture of coke used in iron smelting, an "ammoniacal liquor" results, which forms the raw material for the manufacture of ammonium salts. The distillation of the bituminous shales used in the Scotch paraffin industry also yields a certain amount, and the ammonia produced in other manufactures in which coal and similar substances are used, in iron works, from producer gas plants, and from crabonising, is also collected. The quantity of sulphate of ammonia produced in the United Kingdom is shown in the following table :—

Source.	1911. tons	1910. tons	1909. tons
Gas works	168,783	167,820	164,276
Iron works	20,121	20,139	20,228
Shale work	60,765	59,113	57,048
Coke-oven works	105,343	92,665	82,886
Producer-gas and carbonising works (bone and coal. ...	29,964	27,850	24,705
Total ...	384,976	367,587	349,143

Increases.

These figures show an increase over the production of 1910, with the exception of iron works, which remained practically stationary. The supply from coke ovens shows an increase of nearly 13,000 tons. In 1904 the production in coke-oven works was only 20,000 tons. The total production in 1911 was 385,000 tons and 292,000 tons were exported, so that the balance remaining for home consumption for all purposes amounted to 93,000 tons, as compared with 84,000 tons in 1910 and 85,000 tons in 1909. The exports of sulphate of ammonia are principally to the United States, Japan, Spain, Dutch East Indies, British West Indies and Italy.

Sources.

The largest industrial source of sulphate of ammonia is still the widely distributed and important manufacture of illuminating gas from coal but the relative proportion as compared with the total production is becoming less owing partly to advances in methods of gas manufacture which permit of a greatly increased production of gas per ton of coal carbonised and partly to the rapid growth of the more recent processes for recovery of bye-products from coke-oven gases and from producer gas,

During the last year much attention was attracted to methods by which ammonia present in crude gas, either from the gas retort or from the coke-oven, could be obtained in the form of a solid salt fit for sale but without the necessity of providing sulphuric acid as is the case at present in all works producing sulphate of ammonia.

In the table below are shown the imports of the materials used in the fertiliser trade, the principal being mineral phosphates. A proportion of the nitrate of soda imported is used in the manufacture of sulphuric and nitric acids.

	1911. Tons.	1910. Tons.	1909. Tons.
Guano ...	34,124	20,395	20,321
Mineral phosphates	493,413	455,593	451,807
Nitrate of soda ...	128,487	126,498	90,207

The figures show considerable increases compared with 1910.

The number of chemical manure works under inspection in 1911 was 159, as compared with 167 in 1907. In Scotland the chemical manure works numbered 37, or one less than in 1910.

THE DEVELOPMENT OF AGRICULTURAL CO-OPERATION IN GREAT BRITAIN.

The *Journal of the Board of Agriculture* for October, 1912, has an article on Co-operative Agricultural Distributive Societies. These Societies undertake the collective purchase of the manures, seeds, implements, etc., required by the members and the collective sale of their produce. There were 145 such societies at work in 1909 in England and Wales, and 31 in Scotland as compared with 4 and 1 respectively in 1895. In England and Wales in 1909 the membership was 13,589, the total sales were £885,683, and the profit £8,140; while in Scotland in the same year the membership was, 3,860, the sales £227,141, and the profit £1,948.

With regard to egg and poultry societies there were, at the end of 1909, fifteen such societies in England and Wales, with a membership of 986 and total sales amounting to £15,453 while in Scotland there were two such societies with a membership of 89 and total sales amounting to £438.

Co-operative Productive Societies are occupied in buying, manufacturing and selling the produce of the individual members, and their operations are chiefly confined to the dairying industry. In 1909 there were 18 such societies in England and Wales with a membership of 1,048. a share capital of £20,356, total sales amounting to £66,506 and a profit of £640, as compared with 7 societies in 1895 with a membership of 665, share capital of £13,597, total sales amounting to £17,544 and a loss of £120. In the case of Scotland 5 societies were at work in 1909 against 1 in 1895, and the sale had increased from £11,786 in 1895 to £37,317 in 1909. There was a loss on the working of these Scottish societies in both years.

An important position among these societies is held by the cattle and pig insurance societies. Their number and work have, however, increased only very slightly, viz., from 55 with a membership of 3,424 and reserve funds of £6,599 in 1899, to 57 societies with a membership of 3,954 and reserve funds of £7,671 in 1909 in the United Kingdom.

INTRODUCTION OF DATE PALM INTO CEYLON.

Early in 1906 the Secretary of the Ceylon Agricultural Society (Mr. E. B. Denham) procured through the Principal of the School of Agri culture, Ghizeh, 28 date suckers made up of four varieties :—

(1) SIWI—a comparatively short but thick and fleshy amber-yellow date. It is not dried but pounded and kneaded together into a kind of paste or cake which constitutes an important article of food amongst the poor. It comes late in season.

(2) BIRKAWI or HAYANI—a long red date becoming almost black when completely ripe. It comes to maturity early and is eaten fresh.

(3) SULTANI—a short date with a reddish end and yellow or bright brown base. It is late in season, requires much heat for ripening, dries easily and is eaten dried. The flesh is somewhat thin and the seed bulky.

(4) AMHAT—a comparatively small and somewhat early date whose skin easily peels off. When ripe it becomes dull in colour, very sweet and soft. Owing to their richness in sugar these dates ferment easily. It is one of the best varieties and is extensively eaten.

Owing to delay in transit and failure to deal promptly with the plants on their arrival, they were quite unfit for propagation purposes and, though carefully looked after at the places to which they were despatched (Jaffna, Mullaitivu, Mannar and Hambantota), did not survive.

The trial must be put down as an unsatisfactory one, as the suckers were not given a fair chance.

The presence of the date palms in Peradeniya and elsewhere proves that the palm will grow in the island. The only question is whether it could be induced to mature fruit in suitable localities, if such exist. To ascertain this it will be necessary to make a further trial.

Fletcher in his paper on the date palm (*Agricultural Ledger*, 1906, No. 1) makes the following statement as to climatic conditions.—"It is not in every portion of the sub-tropical zone, comprised between the parallels of 20° and 35°, that the date palm will ripen fruit. This occurs only where the summer is both hot and dry and the winter not too cold. Thus in the West Indies and Florida the humidity of the air is too great for fruit to ripen though the trees grow well; in North-West Mexico, again, sea breezes keep the air too moist and cool, while in the valleys of Lower California large quantities of dates are grown."

As regards humidity and rainfall the same authority says :—"Rainfall during the flowering and fruiting period should not much exceed 5 inches. It must not, however, be concluded from this that the palm will grow if this amount of rain is the only source from which its roots can obtain moisture during the period or, during the year, say twice this amount *i.e.*, 10 inches. For instance, the annual rainfall at Cairo is about 1 inch, and this is insufficient to support any kind of vegetation; date palms, however, grow and ripen fruit there well. This result is only attained by irrigation. Irrigation is an absolutely essential accompaniment to cultivation of the date palm. For, if the rainfall is sufficient to allow of the growth of the tree with this as its only source of water, it will be too great to allow the flowers to be pollinated well and the fruit to ripen.

This unique requirement of date culture with regard to water lies at the root of all the failures to extend its cultivation in India, as will be pointed out later."

On the subject of sunshine and temperature we read: "The requirements of the date palm in regard to temperature are very peculiar as, when in a dormant condition it is not injured by temperatures as low as 20°F., while no upward limit to its endurance has been found. Indeed, extremely high temperature is absolutely necssary to enable it to ripen its fruit and neither flowers nor fruit are formed unless the mean temperature rises above 64·5°F. If the mean temperature for the fruiting season (May to October) is above 70°F. and for one month at least above 80°F., early varieties of dates will ripen fruit, but for the moderately late varieties these temperatures must be above 75°F. and 85°F. respectively, and for best and latest 84°F. and 94°F. Further, not only are these temperatures in the shade necessary, but the tree must be exposed to the direct rays of the sun and will not grow under the shade even when young."

The question as to whether date planting would be profitable on our low dry country must be considered an open one. There is no instance as far as we aware of successful date growing on a plantation scale so near the equator, but yet certain favourable conditions would seem to be present and available which warrant a trial; *e.g.*, heat, dryness (in certain parts), irrigation. Does the temperature drop low enough for the tree to have a period of rest? Is a period of rest necessary for success? These are two questions that require clearing up.

THE NEW YORK RUBBER EXHIBITION.

The Exhibition held in New York from September 23rd to October 3rd last is the third International Rubber and Allied Trades Exhibition.

It is to the credit of Ceylon that the very first Exhibition specially devoted to Rubber was held at Peradeniya in 1906 when Sir Henry A. Blake was Governor. The *India Rubber World*, referring to it says:— "Who will deny that the seed sown has germinated and fructified in the immense extension which has since marked the rubber industry?"

Then followed the London Exhibition of September 1908—the first of the International Series. The second was also held in London in 1911. In the case of the present, as of past exhibitions, the Organising Manager is Mr. A. Staines Mander, who is ably assisted by his Secretary Miss D. Fulton.

The Commissioner for Ceylon at the New York Exibition is Mr. F. Crosbie Roles, Editor of the "Times of Ceylon," who, though a journalist by profession, has placed himself in close touch with the planting industry of the Island. Mr. Roles was one of the Commissioners at the St. Louis Exhibition in 1904, and has visited the States on several other occasions, so that he is well acquainted with the interests of the American people. The Ceylon section, which is illustrative of Kandyan architecture, will fully demonstrate the details of growing, gathering and preparing rubber as carried on in this Colony.

The programme of events in connection with the Exhibition promises to provide a feast of information which, when printed and published, should prove of great utility to all those interested in the industry who had not the opportunity of being present at the conferences and discussions.

AGRICULTURE IN NYASALAND.

TOBACCO.

The *Report of the Director of Agriculture*, Nyasaland Protectorate, for the year ended 31st March, 1912, has been issued. The acreage under tobacco in the Protectorate was 4,507 as compared with 3,274 in the previous year. The export amounted to 2,146,615 lbs. which showed an increase of 441,978 lbs. in weight. The crop at present being harvested covers an area of 7,411 acres.

The reports of experts show that the year under review was not a good one for quality, and this can be attributed to a marked absence of sunshine to mellow and ripen the crop. There was a considerable quantity of leaf which showed up green after curing.

The Director in the report says that from conversations with some leading brokers in London he formed the opinion that good ripe Mahogany with body was in greater demand than thin bright leaves of good colour for cigarette manufacture.

The Home Market for Tobacco.

No supply of Virginian tobacco outside the American crop is attracting so much attention as the Nyasaland product and this can be readily understood when one realises that the Nyasaland crop of over two million pounds is a considerable factor in the tobacco market, as the total weight of tobacco cleared for consumption in the United Kingdom during 1911 was 91,594,642 lbs.

There is some difficulty in getting manufacturers to try Nyasaland tobacco as a constituent for mixtures, though some firms who had given the tobacco a fair trial in the majority of cases had placed larger orders with brokers this year than last.

It is always a difficult matter to introduce a staple from a new country into a market which for years has drawn its supplies from one or two recognised centres of production. People in new countries have an erroneous idea that buyers are waiting expectantly for their crops whereas the truth of the situation is that brokers frequently have to use tact and persuation to get manufacturers to test the value of such products.

The moisture content in tobacco should not exceed 12 to 13 per cent, though in some consignments of Nyasaland tobacco it exceeded 20 per cent., and, as duty is paid by weight, manufacturers are not inclined to purchase tobacco containing 20 per cent. as they have to pay duty on the extra water.

It was also pointed out that tobacco packed in double canvas was better than when paper and canvas is used.

COTTON.

The year has been a disastrous one for cotton-growers in the Shire Highlands where abnormally sunless weather prevailed throughout the maturation period of the crop.

The prospects were encouraging in November and December as the seasonable rains gave on a whole an even stand of young plants, but as the season continued the weather remained dull and sunless with the result that many of the flowers became diseased and shed leaving the trees practically without fruit. The damage was increased by insect attack the most formidale pests of the season being boll-worms and *aphis*; under such conditions it is not a surprise that there was a small percentage of first grade cotton.

The cotton exported amounted to 3,392 bales of 400 lbs. lint as against 4,342 in the previous year and the acreage under European cultivation was 23,332 as compared with 12,752 in 1910-11. The failure of last season's crop and the scarcity of labour discouraged European planters from extending their cotton acreages. The crop now approaching harvest covers an area of 24,155 acres, which is only 823 acres more than in the year under review.

The best Nyasaland cotton had a steady demand from 7·25d. to 8·50d; second quality selling at the prevailing American "Midland" prices of 5d. to 6·50d. per lb.

The continuous carrying out of seed selection on all estates is worthy of most serious endeavours as it is the only way to maintain and improve the quality of local cotton. While selecting we should try to get as much cotton as possible with a staple of 1" or over; as shorter staple of 1" to 1" may make a difference of ½d to 1d per lb; strength and lustre should also be selected for, the higher the lint percentage, the more profitable the crop.

"When in Manchester I was requested to draw attention to the undesirability of putting up cotton in small bales," says the Director of Agriculture of the Nyasaland Protectorate "as apart from the extra expense of canvas and transport, planters on the average lost ¼d. to ½d. per lb. when the cotton was sold, as similar cotton packed in standard bales of 400 lbs. always sold better than cotton in small bales;" and in another paragraph he remarks that he understands the British Cotton Growing Association re-bale and compress cotton, using planters' own canvas from the small bales, at £2 2s. 6d. per ton and, supposing an increase of ¼d. per lb. is received for the cotton, as the result of re-baling, the transaction is profitable as in addition there is a considerable saving in freight.

In spite of the adverse climatic conditions the industry continues to increase in popularity with the natives, and the returns for the year show a satisfactory increase of 270 tons seed cotton.

The following figures show the progress of the native cotton industry from the year 1908-9:—

		Tons seed cotton.		Bales of 400 lbs. lint (27% of seed cotton.
1908/9	...	130	...	196
1909/10	...	220	...	332
1910/11	...	692	...	1,046
1911/12	...	962	...	1,454

A COLLEGE OF TROPICAL AGRICULTURE.

University of the Philippines
College of Agriculture,
LOS BANOS, October 22nd, 1912.

The Editor of the *Tropical Agriculturist*,
Colombo, Ceylon.

Dear Sir,—I note in your issue of September, 1912, pages 255 and 256, some observations regarding the need of a Tropical College of Agriculture, and the statement that "Neither Great Britain nor the United States of America can be said to have a Tropical Department worthy by the name, attached to any of their Agricultural Colleges." This is probably literally true, as the Philippines are not, strictly speaking, a part of the United States, and the University of the Philippines is supported entirely from the revenues of the insular Government. There is, however, the College of Agriculture of this University operating under the American flag, thoroughly well established with some 280 students and more than three years of work to its credit. I believe that it accomplishes exactly the end you desire to be accomplished by a Tropical College of Agriculture, and that the instruction given in it covers sufficiently closely that which is desired in Ceylon and elsewhere in the tropics, so that students trained here would be found well trained for use in other tropical countries.

However, I do not, for a moment, think that the presence of a well equipped college in the Philippines which has already demonstrated that it can give a good education in Tropical Agriculture, is to be entertained as a reason for not establishing similar institutions in other tropical lands. On the other hand, the demand which has been shown here for instruction in tropical agriculture is the best possible reason for believing that similar institutions will succeed elsewhere. This college opened its doors in 1909, and during the first year had 55 students. The attendance was 95 the second year, 177 the third year, and is now, as already stated, more than 280. The demand for admission promises to be so great next year that the proposition of limiting the attendance seems to be seriously considered. There is such an industrial demand for the graduates that, except in the case of a few individuals who are educated under contract to enter the Government service, none of them have so far been willing to do so. I do not imagine that there is such a demand for agricultural education in Ceylon or in any other tropical British Colony as there is in the Philippines, but the success which has attended the work of a College of Agriculture here should certainly be a great encouragement to those interested in this project elsewhere.

Very respectfully,
E. B. COPELAND.
DEAN, COLLEGE OF AGRICULTURE.

[Professor Copeland's interesting account of the success of the Philippines College of Agriculture affords, as he suggests, great encouragement for Ceylon.—ED. *T.A.*]

TAPPING TODDY PALMS.

The three palms that are tapped for toddy in Ceylon are (1) the Coconut (*Cocos nucifera*), (2) Kitul (*Caryota urens*), and (3) Palmyrah (*Borassus fiabillifer*).

The following is a description of the process of tapping for the production of toddy, which is nothing more or less than the juice of the tender flower (or inflorescence) of the above mentioned palms:—Before the flower opens, and while it is still encased in its sheath, it is prepared for tapping by the toddy drawer who bruises it with gentle taps of a small mallet or piece of bone, repeating the operation till the juice is ready to flow. He then cuts off the end of the flower and ties a pot to receive the juice as it exudes drop by drop. The operation is repeated daily, generally in the morning and evening; a thin slice being cut off the end of the spathe on each occasion to excite and allow of the flow of sap. This sap when it first falls into the pot is entirely free from fermentation and highly charged with sugar, the saccharometer generally reading about 1,060. Unless special precautions are taken to prevent it, vinous fermentation soon sets in and continues till all the sugar is converted into alcohol. The method adopted to prevent fermentation is to coat the pot internally with fresh lime. If the toddy is left long enough acetic fermentation will follow with the production of vinegar. Fermentation may be hastened by the introduction of ferments or by the addition of fermented toddy. It may be delayed by putting into the clear pot before it is hung up the bark of the Hal (*Vateria acruniala*) or Ankenda tree (*Achronychia laurifolia*). Fresh fermented toddy is known as "sweet toddy" and fermented toddy is called "sour toddy:" but the latter term applies to liquor which varies much in alcoholic contents and may contain as much as 10 per cent. alcohol.

Sweet toddy is boiled down for preparing treacle (locally called honey), and jaggery or palm sugar, while fermented toddy is chiefly used for the distillation of arrack.

The method of distillation as generally followed is ot the primitive pot-still type and depends on rule of thumb, no testing instruments being employed.

Our illustrations show:—

(1) Kitul Palm.

(2) Toddy-drawer climbing Coconut tree.

(3) Arrack distillery,

COCONUT CLIMBER.

KITUL PALM (CARYOTA URENS).

ARRACK DISTILLERY.

THE USE OF A LIGHT IRON PLOUGH IN PADDY CULTIVATION.

I would like to preface my remarks with a few words about the begining of this ploughing movement. Until 1909, fields at Tissa were prepared by puddling with buffaloes. In that year almost all the buffaloes in the district died of rinderpest and the cultivators found themselves in a serious pass. Mr. L. S. Woolf, then the Assistant Government Agent of Hambantota, who took a keen interest in the agriculture of his district, represented matters to the Agricultural Society and asked for assistance.

The Secretary, with the co-operation of Mr. W. Hunter at that time connected with Messrs. Walker, Sons & Co., selected a few light iron ploughs and sent them to the Hambantota district in charge of three Agricultural Instructors with a view to demonstrate to the cultivators the working of the implements. A series of these demonstrations was given at various centres and three types of ploughs—"Pony," "Climax," and "Meston"—were used drawn by cattle. As a result a large number of these ploughs were bought by the cultivators and the situation was saved.

The use of iron ploughs has, however, gradually decreased but in their place the native wooden-plough which, had hitherto never been used, came to be adopted as being of lighter draught and better suited to the stamina of the oxen.

As a result of the success of the demonstrations at Tissa applications came from all parts of the Island—Kalutara, Badulla, Ratnapura, Kurunegala, Kandy, etc., asking that ploughing demonstrations be given.

The most systematic work in this direction was done in the Rayigam Korale with the assistance of Mudaliyar Wirasinghe, and the "Meston" plough (weighing 28 lbs.) came into favour. With a view to ascertaining whether the improved tillage gave a better yield, five plots were prepared with the "Meston" and five others with the native plough. The following table gives the results of these trials :—

No. of Plot.	Area in acres.	Kind of Plough used.	Yield of Grain in Bushels.	Yield of Grain from an acre in Bushels.	Bushels in favour of iron plough.
1 A.	1	Native	38	38	—
1 B.	1	Meston	48	48	10
2 A.	1	Native	34	34	—
2 B.	1	Meston	38	38	4
3 A.	½	Native	8	16	—
3 B.	½	Meston	10	20	4
4 A.	1½	Native	45	30	—
4 B.	1½	Meston	68	45	15
5 A.	½	Native	18	36	—
5 B.	½	Meston	18	36	nil

N. Wickramaratne,
Agricultural Instructor.

AGRICULTURE AT DUNDEE.

Section M. of the British Association.

The following is from the opening address by T. H. Middleton, M.A., President of M. Section. Interest in the practice of improved husbandry was first aroused in England by the books of Fitzherbert. The extent to which this author stimulated agriculture may be inferred from the appreciation with which his works were received in his own day, and copied by others for a century. He himself does not appear to have been acquainted with the classical writers. He describes the English practice with which he was familiar; he quotes frequently from the Scriptures and refers to early religious works, but only in writing of animal diseases, when he cites the "Sayinge of the French man," is there any indication that he was influenced by foreign authors. Fitzherbert's "Boke of Husbandry" and "Surueyenge" while they are free from the direct influence of Roman writers, show us, nevertheless, that the English agriculture of his day owed much to Roman traditions. The careful business methods and accounting of the farm bailiffs of the Middle Ages, with which Thorold Rogers has acquainted us, were the methods which Fitzherbert learned and counselled, as they were the methods which Columella taught.

It was between 1523, when Fitzherbert's "Boke of Husbandry" was first printed, and 1557, when Tusser published his "Points of Good Husbandry," that the classical writers began to exert a direct influence on English farming.

The First Impetus Towards Progress.

Both in England and Scotland the first impetus towards progress was economic in its character, and throughout the seventeenth and eighteenth centuries, economic causes were constantly accelerating the improvement of agriculture; but we must not make the mistake of supposing that a rise in prices necessarily brings about improvements in husbandry. A motive for improvement is provided and more labour may be drawn to agriculture, but it does not follow that there will be a real advance, and that there will be more food produced for the use of workers in other industries. Without changes of system, *i.e.*, without improvements based on new discoveries, the effect of a rise of prices in a self-supporting country would merely be to alter the proportion of the population engaged in agriculture, and to form congested districts. This was the danger that threatened England early in the seventeenth and Scotland early in the eighteenth centuries; but fortunately for each country an intellectual revival followed close on the rise in prices, and attention was directed not only to the necessity for more food but to the need for improvements which would afford a surplus for the support of the industrial classes.

The Spirit of the Improver.

Within recent years the improvers of the eighteenth and early nineteenth centuries have been much criticised for their land policy, their enclosures and their treatment of labourers; but one thing at least the agriculturists of 1760-1815 saw more clearly than their modern critics—they recognised that if their country was to become a great manufacturing nation, more food must be grown; and to this task they applied themselves so successfully that, as Porter points out, the land of Great Britain,

which in 1760 supported about eight million inhabitants, in 1831 supported sixteen millions. When we reflect that the implements of husbandry were rude, that thorough drainage had not been introduced, that artificial manures (except crushed bones) were scarcely known, that oilcakes were scarce, that grain was too valuable to be given freely to cattle, that in bad seasons live-stock had to be starved so that men might be fed, that in good seasons prices fell rapidly, and with them farming profits, and that credit was difficult to obtain and interest high, those of us who know something about the ordinary work of the farmer can realise the strenuous efforts that must have been necessary to wring from land a sufficiency to feed this rapidly growing nation and to maintain it in health and comparative comfort. Even as late as 1836 Porter shows that it would have been impossible to feed any considerable part of the people on imported food. "To supply the United Kingdom with the single article of wheat," he says, "would call for the employment of more than twice the amount of shipping which now annually enters our ports."

Part of the additional food-supply was obtained by enclosing about seven million acres of land between 1760 and 1834; but as more than three times this area must already have been enclosed as much of the land enclosed after 1760 was of poor quality, and as all of it had formerly contributed in some degree to the food-supply of the country, it is obvious that between 1760 and 1834 the rate of production per acre must have been largely increased.

Improvements in the arts of agriculture cannot be rapidly introduced; there is first of all an experimental stage and when improved methods have been learned they pass slowly from district to district. Before any marked advance in the art can take place, there must therefore occur a period during which a foundation is being laid. It was about 1760 that our population began to increase rapidly and it was then that agriculturists were called upon to produce more food. As we have seen, they were able to double the food-supply in seventy years. It cannot be doubted that this marvellous feat was rendered possible by the pioneer societies of the preceding century, or that it was the spirit of the improver, which the early associations had fostered, that animated the men from whom Arthur Young and Sir John Sinclair learned. If in place of those enterprising agriculturists whose improvements are described in the reports of the first Board of Agriculture, our shires had been occupied by the dull-witted country gentlemen referred to by Lisle, or the "upstart sparks" condemned by Mackintosh, the history of this country must have been very different. Behind the military and naval victories which made Britain a great Power, was a commissariat supported by the agricultural classes. For the great industrial army which the genius of Arkwright, Watt and other inventors provided with employment there was raised an ever-increasing food-supply. Political and industrial development alike depended on the rate of increase of the population, and this again on the rate at which the means of subsistence could be raised from British soil.

The Task of the British Association.

Although the economic position has undergone a revolution there is still work for the improver; no longer indeed do our industrial classes depend for subsistence on the surplus products of the British farmer, but after a long period of forgetfulness once again it has been recognised that

a progressive agriculture is essential to the well-being of the nation. This is not the time to discuss the nature of the questions which press upon us to-day; but let us not forget that they are our questions. To this newly-formed section of the British Association has descended the task of the early associations; it is the privilege of its members to preserve and to hand down to their successors that spirit of the improver which animated alike the ancient writers of Greece and Rome and the British societies of the seventeenth and eighteenth centuries; and to-day we may take to ourselves the exhortation of Walter Blith, for his words apply to Section M. as they did to its predecessors, "from you, I expect and wait for more discoveries of some thing, I scarce know what to name it, which lies yet in obscurity, but I will call it the Improvement of the Improver."

EXPORT OF PLANTS TO SOUTH AFRICA.

The following is a copy of a notice received by the Department of Agriculture regarding the export of plants to South Africa:—

UNION OF SOUTH AFRICA.

NURSERYMEN WITH SOUTH AFRICAN CUSTOMERS are hereby respectfully informed that plants, excluding bulbs and seeds, are admitted into the Union from oversea only under special permit. Permits are not given at all for conifers, or for eucalyptus, or acacia trees. They are freely given without regard to quantity for house palms, ferns, carnations, geraniums, chrysanthemums, orchids and many other tender plants; but are given only for ten plants of a variety in the case of ornamental shrubs. While for fruit bearing plants and roses and for trees in general, they are given only for varieties that are not procurable in the Union and that cannot be grown from seed, and for not more than ten of a kind. It is desirable that nurseymen refrain from filling any order in the absence of knowledge that a permit has been issued or is practically certain to be issued with respect to it. Applicants are supplied with permits in duplicate so that one copy may be sent with the order. Lables and INVOICES should invariably give the varietal names of trees shrubs, roses, climbers, etc., as otherwise the inspectors may not be able to connect the plants with the permits. In filling orders for the latest varieties of roses, and orders for other plants for which customers may say they are unable to get permits in advance of ordering owing to their not being able to give the varietal names, it is advisable to send to the customer a list of what varieties will be supplied a week or two ahead of despatching the plants. This action would admit of the customer getting a permit before the plants arrive and thus perhaps avoid serious delay in the delivery of the consignment.

Department of Agriculture,
Division of Entomology,
Box 513, Pretoria,
September, 1912.

AGRICULTURE IN SEYCHELLES.

To the ordinary individual a knowledge of the Seychelles is usually limited to the fact that it is the home of the double coconut (*Loidoicea Seychellarum*) of our museums, but recently these Islands have proved of more than ordinary interest to us from the fact that we gave them a Governor from our local Civil Service, and that last year they sent their Curator of Botanic Gardens here on a visit of investigation.

Mr. Dupont. whose name is familiar as a worker in Tropical Botany and Agriculture, was connected with the Colony of Mauritius before he went out to the Seychelles. and his report which is before us proves the thoroughness with which he carried out the mission upon which he was sent.

Mr. Dupont's tour in the East included visits to Mauritius, Karachi, Bombay, Poona, Madras, Colombo, Negombo, Chilaw, Heneratgoda, Veyangoda, Peradeniya, Hanwella, Mahailuppalama, Cochin and Calicut.

During his sojourn in the Island he visited some of the best coconut and rubber plantations, the Heneratgoda and Peradeniya Gardens and the Experiment Stations at Gangaroowa and Mahailupalama, besides the Stock Garden, Government Dairy and Training College.

Referring to the Royal Botanic Gardens, Mr. Dupont says :—"I think it pays a botanist or an agriculturist better to spend a month or even two at Peradeniya and collect information and plants than to go round the whole tropical world for the same purpose."

Nothing appears to have escaped the observation of our visitor who touches upon everything that came in his way, whether referring to Agriculture, Botany, Entomology, Manures, Education, Dairying, Poultry, Fishery, Brickmaking, Arrack distilling, Birds or Sericulture.

The following note on Cochin copra and oil should interest the coconut planter :—"Cochin copra is famous in Marseilles where it fetches always a higher price than the other copras. 17,500 tons of copra are exported from Cochin. The rainfall is 115 inches and the mean temperature 82°. The soil is cabooky with a sandy top layer like Ceylon low country soil. There is no reason to suppose that the soil and climate have an influence on the quality of copra but I soon learnt on visiting an estate outside the town that copra is purchased from the natives by the merchants who cause all the bad-looking material to be removed and turned into oil, with the result that only selected and pure white copra is exported. On that same estate I noticed a curious method of extracting oil from copra which is first disintegrated in the ordinary way and then placed in a battery of small metal mortars grooved in a particular way. Both the mortars and the pestles are grooved and the extraction is said to exceed 60 % being a little less than that obtained by hydraulic press. The Superintendent in charge of the estate mentioned to me that they stopped the use of the hydraulic press owing to the large consumption of filtering cloth which is expensive (Rs. 3·00 a yard) and used only two or three days. I noticed 48 mortars which took 1¼ H. P. each from an engine of H. P."

Altogether Mr. Dupont's report of 56 pages (foolscap) makes an interesting record of hard travelling and close observation, and the large collection of plants he has introduced into the Seychelles as well as the useful information he has gathered should prove of great value to the Colony with which he is connected.

THE TREATMENT OF COMMON WOUNDS OF LIVE STOCK.

The following extracts are culled from a paper by Mr. W. Kennedy, printed in the *Agricultural Journal of British East Africa for June, 1912.* There are five kinds of wounds which may be classified as follows:—

1. Incised wounds caused by a knife or sharp instrument.
2. Punctured wounds caused by thorns, etc.
3. Lacerated wounds caused by barbed wire, etc.; wounds caused by horning in cattle are generally contused and lacerated.
4. Poisoned wounds caused by an infected instrument, such as a poisoned arrow or spear, also bee stings, snake-bite, etc.
5. Bullet or shot gun wounds.

Treatment.

If the wound is bleeding profusely when seen, the first thing to do is to stop hæmorrhage. If large blood vessels are injured they should be ligatured if possible, using aseptic silk or gut for this purpose. Where the bleeding is from small vessels the application of perchloride of iron (Liquor Ferri pechloridi) on a plug of tow is usually effective, The actual cautery may be used in some cases and another method is to pack the wound with aseptic cotton wool or tow and bandage it tightly in position.

If the animal is weak from loss of blood it is advisable to administer a stimulant such as whisky, ½ pint in a pint of milk or sweet spirit of nitre and sal volatile, one ounce of each in a quart of water. (These doses are suitable for a horse or ox.)

As soon as the hæmorrhage has been stopped the next thing to do is to clip the hair off the adjacent parts and to thoroughly cleanse and disinfect the wound and surrounding parts. If a rifle bullet is lodged in a wound or under skin, it should be removed if possible, but where it is deeply situated it is often advisable to leave it alone as important structures may be injured in attempting to remove it. The same applies to small shot in a wound.

Disinfectant.

The following may be regarded as good disinfectant solutions for wounds:—

1. Carbolic Acid, 1 part; Boiled Water 20 parts.
2. Corrosive sublimate, 1 part; Common salt, 8 parts; Water 1,000 parts.
3. Jeye's Fluid, 1 part; Water 50 parts.
4. Zinc Chloride, 1 part, Water 40 parts.

If the wound is an incised one, *i.e.*, clean cut, after cleaning and disinfecting it should be stitched with aceptic silk, cat-gut, horse-hair or silk, and either bandaged with a piece of lint and bandage, or if in an awkward place to bandage, dressed liberally with an ointment such as Jeye's Fluid 1 part, Lard or Vaseline 20 parts, or Stockholm Tar in order to keep the flies off.

Should the wound be a lacerated one, full of sand and grit which cannot be entirely removed, two courses of treatment are open depending on the size, situation and nature of it. If the wound is very extensive and the muscles are badly torn it is advisable to stitch the severed skin in accurate apposition as far as possible, leaving an aperture at the lower end of the wound to allow of drainage and the daily washing out of the wound with disinfectants. Should the direction of the wound be downwards and inwards a counter opening will have to be made to allow drainage from the depths of the wound. In this drainage channel a piece of rubber tubing or a strip of gauze should be inserted after each dressing to keep the orifice of the drainage channel open.

ROOT DISEASE IN HEVEA.

The Editor of the "*Tropical Agriculturist,*"

DEAR SIR,—The Supplement to the *Tropical Agriculturist* for October contains a letter from "Bode," (reprinted from "Grenier's Rubber News"), dealing with the prevention of the root disease of Hevea caused by *Fomes semitostus*, the text of which is an alleged quotation from my book on "The Physiology and Diseases of Hevea."—"It is impossible to get rid of *Fomes semitostus* if the stumps which bear the fungus are not removed: neglect of that operation is the chief source of danger." "Bode" apparently disagrees with that.

The sentence in question is taken from a paragraph which describes the treatment of *an existing case of disease*, where several Hevea trees have died round a jungle stump which is known to have been the original host of the fungus, and probably is then producing the fructifications. Surely, in such a case, where the stump has been proved to bear the fungus, "Bode" would not hesitate to remove that particular stump.

I may further point out that "Bode" adapts his text to fit his theme. It should read "neglect of that operation is the chief source of failure," *i.e.*, failure to eradicate the disease from a particular spot where it has already made its presence known.

T. PETCH.

PERADENIYA, November 13, 1912.

RAT POISONS.

The *Journal of the Jamaica Agricultural Society* for September, 1912, says that the least successful poison for rats is Arsenic. One of the cheapest, best and safest is Plaster of Paris, not a poison in the ordinary term but mixed with cornmeal or oatmeal most effective in rotation with Barium Carbonate. Extermino, a patent rat killer, has been usually successful here. We have always, remarks the *Journal*, laid stress on variation of poisons and variation of traps; and the use of bamboo pots for safety against stock taking the poisons.

MARKET RATES FOR TROPICAL PRODUCTS.

(From Lewis & Peat's Monthly Prices Current, London, 11th September, 1912.)

	QUALITY.	QUOTATIONS.
ALOES, Socotrine cwt.	Fair to fine ...	65s a 70s
Zanzibar & Hepatic ,,	Common to good ..	50s a 82s 6d
ARROWROOT (Natal) lb.	Fair to fine ..	8d a 9d
BEES' WAX, cwt.		
Zanzibar Yellow ,,	Slightly drossy to fair ...	£6 15 a £6 17/6
East Indian, bleached ,,	Fair to good	£7 17/6 a £8 2/6
,, unbleached ,,	Dark to good genuine ..	£5 17/6 a £6 10s
Madagascar ,,	Dark to good palish	£6 15s a £7 2s 6d
CAMPHOR, Japan ,,	Refined	1s 6d a 1s 8½d
China ,,	Fair average quality ...	155s
CARDAMOMS, Tuticorin	Good to fine bold	5s a 5s 6d
	Middling lean	4s 4d a 4s 9d
Malabar, Tellicherry	Good to fine bold ..	4s 11d a 5s 5d
Calicut	Brownish ..	4s 4d a 4s 9d
Mangalore ,,	Med brown to fair bold	4s 5d a 5s 8d
Ceylon, Mysore ,,	Small fair to fine plump	4s a 6s
Malabar ..	Fair to good ..	3s 7d a 3s 10d
Seeds, E. I. & Ceylon ,,	Fair to good ..	4s 3d a 4s 6d
Ceylon Long Wild ,,	Shelly to good ..	1s 2d a 3s 2d
CASTOR OIL, Calcutta ,,	Good 2nds .	3¾d
CHILLIES, Zanzibar cwt	Dull to fine bright ...	40s a 45s
Japan ,,	Fair bright small ..	28s 6d a 32s 6d
CINCHONA BARK.– lb. Ceylon	Crown, Renewed	3⅜d a 7d
	Org. Stem	2d a 6d
	Red Org. Stem	1¾d a 4¼d
	Renewed	3d a 5¼d
	Root	1⅞d a 4d
CINNAMON, Ceylon 1sts per lb.	Good to fine quill	1s 3d a 1s 7d
2nds	,, ,,	1s 4d a 1s 6d
3rds	,, ,,	1s a 1s 5d
4ths	,, ,,	1s a 1s 4d
Chips, &c..	Fair to fine bold	2d a 3d
CLOVES, Penang lb.	Dull to fine bright pkd.	11d a 1s 1d
Amboyna ..	Dull to fine	9d a 10d
Ceylon ..	,, ,,	7½d a 9d
Zanzibar	Fair and fine bright	7½d a 7¾d
Stems ..	Fair	2½d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	80s a 113s
Native	Good ordinary	Nominal
Liberian ,,	Fair to bold	75s a 85s
COCOA, Ceylon Plant. ,,	Special Marks	77s a 90s
	Red to good	70s a 76s 6d
Native Estate ,,	Ordinary to red	42s a 75s
Java and Celebes ,,	Small to good red	25s a 82s 6d
COLOMBO ROOT ,,	Middling to good	10s a 17s
CROTON SEEDS, sift. cwt.	Dull to fair	70s a 80s
CUBEBS ,, ..	Ord. stalky to good	150s a 170s
GINGER, Bengal, rough,,	Fair	35s nom.
Calicut, Cut A ,,	Small to fine bold	82s 6d a 85s
B & C ,,	Small and medium	65s a 80s
Cochin Rough ,,	Common to fine bold	38s a 42s 6d
	Small and D's	37s 6d
Japan ,,	Unsplit	29s
GUM AMMONIACUM ,,	Ord. blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, str. srts	£12 10s a £14 5s
	,, ,, little red	£11 a £12
	Bean and Pea size ditto	75s a £9 10s
	Fair to good red sorts	£7 a £9 10s
	Med. & bold glassy sorts	£5 a £8
Madagascar ,,	Fair to good palish ...	£4 a £8 15s
	,, ,, red ...	£4 a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	38s a 42s
Turkey sorts ,,		39s a 65s
Ghatti ,,	Sorts to fine pale ...	25s a 35s nom.
Kurrachee ,,	Reddish to good pale ...	27s 6d a 35s ,,
Madras ,,	Dark to fine pale ...	27s 6d a 35s ,,
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	£10 a £12
	com. stony to good block	50s a £9
KINO	Fair to fine bright	6d a 1s
MYRRH, Aden sorts cwt	Middling to good	52s 6d a 62s 6d
Somali ,,	,, ,,	50s a 52s 6d
OLIBANUM, drop ,,	Good to fine white	45s a 50s
	Middling to fair	35s a 40s
pickings ,,	Low to good pale	12s 6d a 27s 6d
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	4s 7d
	,, Ceara ,, ,,	1s [illegible]d
Ceylon, Straits, Malay Straits, etc.	Crepe ordinary to fine..	4s 6d a 4s 7½d
	Fine Block ..	4s 8½d
	Scrap fair to fine ..	3s 7d a 3s 10d
Assam	Plantation ..	4s
	Fair II to ord. red No. 1	3s 4d a 3s 9½d
Rangoon	,, ,, ,,	2s a 3s 4d

	QUALITY.	QUOTATIONS
INDIARUBBER. *(Contd.)*		
Borneo	Common to good	1s 9d a 2s 9d
Java	Good to fine red .	3s 4d a 3s 6d
Penang	Low white to prime red	1s 6d a 2s 8d
Mozambique	Fair to fine red ball ...	3s 10d a 4s 6d
	Sausage, fair to good ..	3s 6d a 4s 5d
Nyassaland	Fair to fine ball ...	3s a 4s
Madagascar	Fr to fine pinky & white	2s 9d a 3s 4d
	Majunga & blk coated ..	2s a 2s 6d
	Niggers, low to good ..	6d a 3s 3d
New Guinea	Ordinary to fine ball ..	2s 6d a 3s 6d
INDIGO, E.I. Bengal	Shipping mid to gd violet	3s 2d a 3s 8d
	Consuming mid. to gd.	2s 6d a 3s
	Ordinary to middling	2s 3d a 2s 6d
	Oudes Middling to fine	2s 6d a 2/8 nom.
	Mid. to good Kurpah	2s 2d a 2s 6d
	Low to ordinary	1s 6d a 2s
	Mid. to fine Madras	None here
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s 6d a 2s 8d
	Ordinary to fair	2s 2d a 2s 4d
Java	,, ,, good pale	2s 4d a 2s 8d
Bombay	Wild	7d a 8d
MYRABOLANES, cwt	UG and Coconada	4s 9d a 5s 6d
Bombay ,,	Jubblepore	4s 10½d a 7s
	Bhimlies	4s 10½d a 7s 3d
	Rhajpore, &c.	4s 6d a 6s
Bengal ,,	Calcutta	4s a 5s
NUTMEGS— lb.	64's to 57's	10d a 1s
Singapore & Penang ,,	80's	7¾d
	110's	5½d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 15s
NUX VOMICA, Cochin	Ordinary to good	9s 6d a 12s 6d
per cwt. Bengal	,, ,,	9s
Madras	,, ,,	9s a 9s 6d
OIL OF ANISEED ,,	Fair merchantable	6s 5
CASSIA ,,	According to analysis	3s 6d a [illegible]s 9d
LEMONGRASS ,,	Good flavour & colour	4½d
NUTMEG ,,	Dingy to white	1½d a 1¾d
CINNAMON ,,	Ordinary to fair sweet	2½d a 1s 4d
CITRONELLE ,,	Bright & good flavour	1s 7d
ORCHELLA WEED—cwt		
Ceylon ,,	Fair ..	10s Nom.
Madagascar ,,	Fair ...	10s ,,
PEPPER – (Black) lb.		
Alleppy & Tellicherry	Fair ...	5⅝d
Ceylon ,, ,,	,, to fine bold heavy ..	5⅜d a 5⅝d
Singapore ..	Fair	5½d
Acheen & W. C. Penang	Dull to fine	5¼d a 5½d
(White) Singapore ,,	Fair to fine	8¾d a 9d
Siam ,,	Fair	8½d
Penang ,,	Fair	8d
Muntok ,,	Fair	9¼d
RHUBARB, Shenzi ..	Ordinary to good ..	1s 11d a 3s 3d
Canton ..	Ordinary to good ..	1s 8d a 2s 2d
High Dried..	Fair to fine flat ...	1s a 1s 2d
	Dark to fair round ..	9d a 10d
SAGO, Pearl, large ..	Fair to fine	18s a 19s
medium .	,, ,,	17s a 18s 6d
small ...	,, ,,	14s 6d a 15s
SEEDLAC cwt.	Ordinary to gd. soluble	45s a 60s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8½d
	Fair greenish	3d a 4½d
	Commonspeckyand small	1¼d a 2½d
SHELLS, M. o'PEARL—		
Egyptian cwt.	Small to bold ...	95s a £10 7s 6d
Bombay ,,	,, ,, ...	62s 6d a £11 10s
Mergui ,,	,, ,, ..	£15 15s a £19 5s
Manilla ,,	Fair to good	£13 12/6d a £17 5s
Banda ,,	Sorts	57s 6d a 75s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	9s a 12s
per cwt. Madras	Stony and inferior ..	4s a 5s
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold ..	15s a 34s
	Pickings ..	13s 6d a 25s
TURMERIC, Bengal cwt.	Fair .	22s
Madras ,,	Finger fair to fine bold bright	24s a 26s
Do. ,,	Bulbs	18s a 20s
Cochin ,,	Finger fair ..	21s
	Bulbs ...	15s
VANILLOES— lb.		
Mauritius ... 1sts	Gd crystallized 3½ a 8½ in	13s 6d a 18s 6d
Madagascar ... 2nds	Foxy & reddish 3½ a ,,	13s a 16s
Seychelles ... 3rds	Lean and inferior ...	12s 6d a 13s 6d
VERMILLION ..	Fine, pure, bright .	2s 11d
WAX, Japan, squares	Good white hard ...	47s